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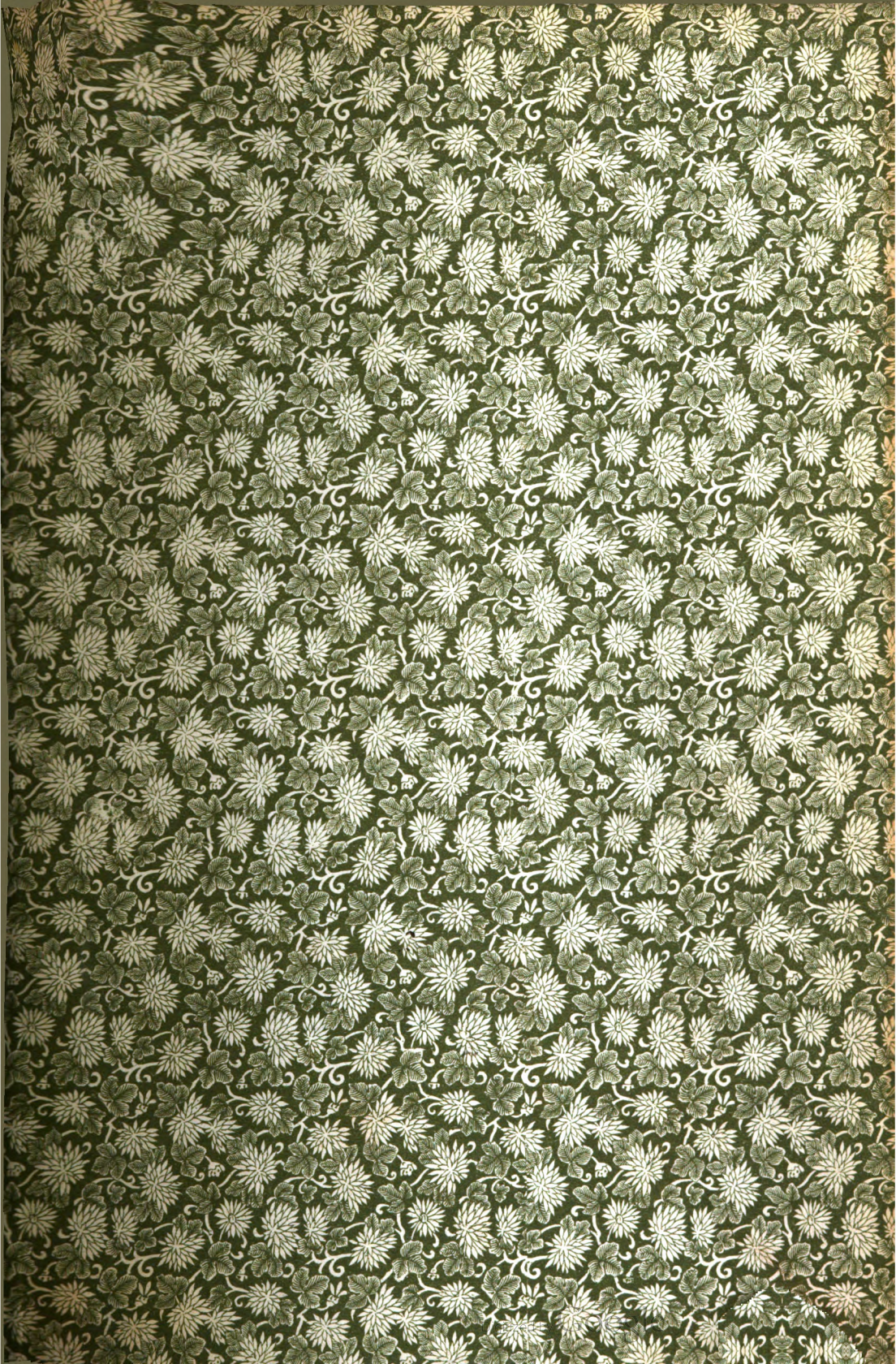
February, 1968



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about twice the work in a given time with the result that the life of the machines is about half that of the standard slide valve type.

The principal trouble to be found in manufacturing institutions is that drills are introduced upon given work requiring at all times their maximum capacity, or in other words, if the larger percentage of drilling is 1¼ inches, drills are purchased with a maximum of 1¼ inch capacity when in justice to the machines if the same conditions as above exist, they should have a maximum capacity of not less than 1½ inch and preferably 1¾ inch. Then these machines will perform from one-third to one-half more work on 1¼ inch holes than the drill with a maximum 1¼ inch capacity, and this same method of figuring should be taken into consideration when installing portable tools of any character. If these small engines were given the care and attention that other tools receive, the cost of maintenance would be a negligible quantity, but they are placed in the hands of unskilled labor without any explanation whatever as to their care and maintenance, are permitted to run for days with but little lubrication, and the following comparison between these small portable engines and the locomotive will give the untrained mind some conception as to the duties performed by each and should have a tendency to create a better feeling towards these portable devices and insure their receiving better treatment.

The class "L" drill, with Corliss valves is capable of more speed than the regular *"Little Giant"* drill. Regardless of what speed we succeed in obtaining out of the *No. 2 "Little Giant" drill,* we can get still more when the same size drill is fitted with Corliss or oscillating valves, but it is a question if it is best to make drills of this extreme speed.

Consider, for instance, the No. 2 class "L", which runs 500 revolutions light. This means 3,500 revolutions of crank in its journals. Stop and consider what this means as an engine. Let us now compare this with an engine of the stationary type and also a locomotive.

First, the stationary engine, say a Corliss of 20 inch diameter, 40 inch stroke, running at 100 revolutions per minute. The piston of such an engine attains a speed of 800 feet per minute. The locomotive, say 19 inch diameter cylinder, 24 inch stroke, 78 inch driver, when running a mile a minute attains a speed of 1,040 feet per minute.

Now the little engine which put up in combination with a drilling spindle is called the *"Little Giant"* drill, piston diameter 1 11-16 inches, stroke 1⅞ inches, speed per minute, 3,500 revolutions equals the piston speed of approximately 1,050 feet per minute, or one mile in five minutes or 12 miles per hour, or 100 miles per day of 10 hours, if the drill is used during eight and a half hours of this time. Truly this is a wonderful performance when we consider that 1,785,000 revolutions of the crank shaft are required to make this piston travel 100 miles, and that the latter piston travels only 1⅞ inches each stroke, and that the piston passes over any given point in the cylinder 3,570,000 times during the day, while the Corliss engine passes any point in the cylinder during the same period 102,000. The locomotive passes 265,200 times, which is only 1-12 as often as the little drill piston, and yet locomotive cylinders and pistons are rebored and refitted quite often, yet if same is required in drill engine within a year, we conclude that something must be wrong with it, notwithstanding that during this period if drill is worked 300 days, this little piston has made 1,071,000,000 strokes and has traveled 30,000 miles or about 5,000 miles more than the distance around the world, and all this without a trained engineer in charge.

On the contrary, it is in the hands of men who have no idea or conception of the machine as an engine at all. If it sticks or hesitates it is shaken, kicked and beaten to see if it will not start again; if not it is thrown to one side. Perhaps some good samaritan will come and pour some oil in it and away it goes again to drill more holes, and if the man in charge is a good faithful worker and feeds the drill at about half of its full capacity, he will have drilled a hole in steel approxi-

mately 12,700 feet deep in the before mentioned 300 working days of ten hours, eight and a half of which the drill is running.

### Sun's Rays Converted Into Power.

By using the principle of the common hotbed by which farmers grow fresh vegetables in the dead of winter, Frank Shuman of Philadelphia, engineer and chemist, thinks he has solved the old problem of converting the heat of the sun into power at such a low cost that its commercial use is possible, says a special dispatch to the Chicago Tribune.

He has now running an engine that gets its power from the sun and it is so simple that a child can operate it. Shuman, who is the inventor of the concrete file used in all skyscrapers and the wire glass, says his machine will revolutionize the motive power of the world.

On the Shuman property in Tacony there is what looks like a big hotbed, 18x 60 feet. It is simply a big wooden box sunk into the ground and covered with a double top of ordinary hothouse glass, with a one inch air space between the layers.

Instead of being filled with vegetables, however, it is filled with coiled iron pipes. These pipes, which are filled with ether, connect with a small upright engine hard by.

The circuit is known as a "closed one"; that is, the ether in the pipes is converted to vapor in the big box, passes through the engine, developing three and a half horse power, thence into a condenser, and back again to the hot box.

No fuel is used, the heat of the sun being relied upon to convert the liquid into vapor. In the tropics water could take the place of ether, Shuman says.

The light rays of the sun in this latitude can be converted into heat and they will yield high temperature. In the tropics this would run to perhaps 500 degrees or higher. The light rays penetrate the double glass cover and are absorbed and converted into heat rays by the dark metallic surfaces of the pipes. The air space prevents the heat from escaping, and whatever is in the pipes will boil.

If there is water in the pipes it will be turned into steam and that steam can be used to run an engine. This small hot box, if in the tropics, the inventor says, would yield about thirty horse power.

Chief Moore of the weather bureau and a string of scientists are coming to see the machine work. Before the patent office would take any stock in it an expert was sent on and he became convinced.

Shuman, who is a wealthy man, frankly admits that his machine will not run in cloudy weather. He believes that by using his solar engine to make liquid air, which in turn can be transported anywhere, coal will be displaced.

### Speed Recorders in Europe.

According to *Railroad Men,* in France every passenger engine is equipped with this instrument. On nearly all the lines on the continent their use is customary, and in some countries even main-line freight engines are so equipped, and the indicators are considered quite as important as steam gages and automatic brakes. It would seem that their use would tend to minimize accidents caused by fast running. The indicator not only shows constantly the speed at which the train is running, but records it in a locked box to which the engineer has no access. The trip record is taken to the office when the engine completes the run. There are said to be 20,000 indicators in use in Europe.

### Required Sand to Do It.

A man bought five pounds of sugar of a grocer, and when he got home discovered that there was three pounds of sand in it. He published a card in the local paper announcing: "I have bought of a certain grocer in this town five pounds of sugar which contained three pounds of sand. If the grocer don't send me five pounds of sugar immediately I will publish his name." In the morning he found five packages containing five pounds each of sugar. There were just five grocers in the town.

# Programme of the Nineteenth Annual Convention of the American Boiler Manufacturers' Association

The nineteenth annual convention of the American Boiler Manufacturers' Association of the United States and Canada will be held at Atlanta, Ga., Oct. 8, 9 and 10, 1907. The Atlanta entertainment committee has already been formed and is in good working shape. Definite plans for the meetings and the program for entertainment of members and guests are nearly completed. The convention will open at the Piedmont Hotel, 10:30 a. m., October 8, in the Assembly Hall. An address of welcome will be delivered by Mayor W. R. Joyner. In addition to the annual address by Col. M. F. Cole, president of the association, addresses will be made by Col. E. D. Meier, president of Heine Safety Boiler Company, New York, and W. H. S. Bateman, southern representative of the *Chicago Pneumatic Tool Company.*

Tuesday afternoon, business session, at 2:30; trolley ride around Atlanta for the ladies, stopping en route at the Piedmont Driving Club for luncheon.

Tuesday evening, convention theater party.

Wednesday morning, business session, 9:30. Ladies will visit stores and take part in individual sightseeing trips.

Wednesday afternoon, at 1 o'clock, the entire convention, with invited guests, will leave the Atlanta Terminal Station in a special train on a forty-mile trip to Newnan, Ga., via the famous Atlanta & West Point route. On arrival at Newnan, the train will be run into the works of the R. D. Cole Manufacturing Company. After an inspection of the works the trip will be continued to Pearl Spring Park, where the entire party will be served a genuine Georgia barbecue. In addition an opportunity will be given the guests to witness the evolution of cotton from the field to the finished product—cotton growing in the field—cotton picking—cotton ginning—cotton spinning and weaving—returning to Atlanta by 6 o'clock.

Wednesday evening entertainment not yet decided upon.

Thursday morning, business session at 9:30 o'clock. Ladies will be taken on a trolley trip over the famous scenic route of the Atlanta Northern Electric railway, a twenty-mile ride, crossing the Chattahoochee river en route to the historic town of Marietta, Ga., where the battle of Kenesaw Mountain was fought, and visiting the National cemetery, where upwards of 15,000 soldiers are buried.

Thursday afternoon, business session at 2:30 o'clock.

Thursday evening, at 8 o'clock sharp, the annual banquet will be held, which will close the convention.

Information in regard to the reservation of rooms and any other matters in connection with the convention may be had by addressing E. M. Cole, secretary of entertainment committee, 316 Empire building, Atlanta, Ga.; M. F. Cole, president A. B. M. A. Newnan, Ga.; Harvey & Wood, Piedmont Hotel, Atlanta, Ga.; J. D. Farasey, secretary A. B. M. A., Cleveland, O.; W. O. Duntley, president Associate Members A. B. M. A., Fisher building, Chicago, Ill., and W. H. S. Bateman, secretary of Associate Members, 820 Arch street, Philadelphia, or The Boiler Maker, 17 Battery Place, New York City.

It is understood that a great many members and their friends from the central west, north and New England states, propose coming to Atlanta via steamer from New York to Savannah, thence by rail to Atlanta, in order to take advantage of the ocean trip. Information in regard to sailing of steamers and reservation of rooms may be had by addressing Mr. Thos. Aldcorn, general eastern sales agent, *Chicago Pneumatic Tool Company,* 95 Liberty street, New York City, or Mr. Henry J. Hartley, superintendent boiler department Cramps Shipyard, Philadelphia, Pa.

The general entertainment committee is

composed of representatives of the following firms, which are all southern members of the association: R. D. Cole Manufacturing Company, Newnan, Ga.; John J. Finnigan & Company, Atlanta, Ga.; George R. Lombard Iron Works & Supply Company, Augusta, Ga.; J. S. Schofield Sons Company, Macon, Ga.; John Rourke & Son and William Kehoe & Sons, Savannah, Ga.; Valk & Murdoch Iron Works, Charleston, S. C.; Merrill-Stevens Company, Jacksonville, Fla.; Casey & Hedges Manufacturing Company, Walsh & Weidener Boiler Company, Lookout Boiler Manufacturing Company, Chattanooga, Tenn., and Marion Iron Works, Marion, S. C.

The Atlanta entertainment committee consists of J. Stewart Cole, chairman; E. M. Cole, secretary; Messrs. W. M. Francis, W. H. L. Nelms, Samuel J. McGarry, John J. Finnigan, Horace Parker, V. A. Moore, Frank Harrison, F. A. Dillworth and others, in connection with the regular standing executive committee of the Supply Men's Association, consisting of W. O. Duntley, vice president and general manager *Chicago Pneumatic Tool Company,* Chicago, Ill.; H. B. Hare, Otis Steel Company, Cleveland, Ohio; W. H. S. Bateman, *Chicago Pneumatic Tool Company,* Philadelphia, Pa.; George Slate, The Boiler Maker, 17 Battery Place, New York; H. S. Covey, secretary Cleveland Pneumatic Tool Company, Cleveland, O.; E. A. Downey, National Tube Company, St. Louis, Mo.; C. A. Hunt, Worth Bros. Company, Cincinnati, Ohio; D. J. Champion, Champion Rivet Company, Cleveland, O.; W. L. Hirsch, American Steel & Wire Company, Pittsburg, Pa.; Columbus Dill, Ashton Valve Company, Boston, Mass.; R. S. Groves, Worth Bros. Company, Philadelphia, Pa.; George Bentley, Central Iron and Steel Company, Harrisburg, Pa.; L. A. Hennock, Joseph T. Ryerson & Company, Chicago, Ill., and H. S. White, Shelby Steel Tube Company.

W. H. S. Bateman,
Secretary of Associate Members and Supply Men's Association, A. B. M. A.

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A man never believes in honesty until he has some of it.

### British Foundrymen Meet.

The fourth annual convention of the British Foundrymen's Association was held at Sheffield, England, August 6 to 8. The attendance was larger than at any previous gathering, 85 members being present, while civic recognition was extended by the Lord Mayor of Sheffield and the master cutler.

Herbert Pilkington was re-elected president. Percy Longmuir, in a paper on "Practice and Theory," referred to the savings commonly claimed for the molding machine. W. H. Sherburn also presented a paper dealing with foundry conditions.

A feature of the meeting was a session in the laboratories of the department of applied science, University of Sheffield, at which a practical demonstration of pyrometry was given. Papers were read on "Special Alloys for Foundry Use" and on "Changes in Cast Iron During Solidification."

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### Thinking One's Self to Death.

Thousands of persons actually think themselves to death every year by allowing their minds to dwell on morbid subjects.

The idea that one has some incipient disease in one's system, the thought of financial ruin, that one is getting on in life without improving prospects—any of these or a thousand similar thoughts may carry a healthy man to a premature grave. A melancholy thought that fixes itself upon one's mind needs as much doctoring as physical disease. It needs to be eradicated from the mind or it will have just the same result as a neglected disease would have.

Every melancholy thought, every morbid action and every nagging worry should be resisted to the utmost, and the patient should be protected by cheerful thoughts, of which there is a bountiful store in every one's possession. Bright companions are cheaper than drugs and plasters.

The morbid condition of mind produces a morbid condition of body, and if the disease does happen to be in the system it receives every encouragement to develop. We need more mental therapy.—Suggestion.

# Packing Foreign Shipments

According to Charles W. Pepper, of the Department of Commerce and Labor at Washington, Americans are the worst packers in the world.

Only a few weeks ago a prominent commission merchant doing a large business in electrical supplies in Cuba, was greeted by a steamship captain in the Havana service on his return to New York with the remark:

"Well, I see you made a heavy shipment of electrical things on my last trip down."

"I did, but how do you happen to know," was the rejoinder.

"Saw the stuff scattered all over the dock at Havana," said the other. "They had to gather it up in scoops and put it back as best they could in what was left of the packing cases."

Another instance was one wherein a shipment of stained glass to be used in decorating the windows of a Cuban church reached its destination in such shape that only about one-eighth of it could be used. The glass was originaly placed in the cases between layers of hay and was but loosely packed. The motion of the ship caused the glass to slip, which soon reduced the hay to an almost pulverized state. The occupancy of the church will be delayed about six months while new glass is being made.

It may not be amiss to call attention to the practice in many instances in foreign ports, where landing facilities are practically non-existent, of landing freight by "beaching." In other words, there are no wharves, or docks, or deep-water harbors and the only way of getting freight ashore is to dump it overboard and tow it in with small boats. Where this is done, it is not difficult to imagine what will happen to goods which are not packed watertight and which cannot stand wetting. Eternal vigilance clearly is the price of safety of things shipped to faraway places, and the shipper had best omit no reasonable safeguard that can be thought of. In the case of one of the largest builders of reed and pipe organs—the Estey Organ Company, of Brattleboro, Vermont—the "beaching" process is provided for by packing the organs for South African ports in substantial tin-lined boxes. Each organ is first put into a comparatively light box and this is set into a strong outer case lined with tin throughout, with soldered seams. The inner box is made necessary by the fact that this organ is not of rectangular shape, and therefore requires special bracing which must be fastened from the outside by screws. If these were put through the tin lining, water would of course leak in.

The Germans, per contra, have been said to be the best packers in the world. Of trade which all should come to American houses, 20 per cent or more, it is said, for this reason is diverted to German channels. German thoroughness does not stop at the packing case, and the contents of this are made self-contained when possible. Take, for example, a miscellaneous collection of small stuff. The articles are not all dumped promiscuously into one large case by the German shipper. He sorts them, packs each lot securely in a separate smaller case, and puts these several cases into one big one, fastening each of the smaller ones to battens on the bottom of the big one. Each case is numbered and labeled, so that its contents are known, and in case of breakage of the big case nothing serious happens. This may be called packing case science which the American shipper rarely practices.

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### Southern Tragedy.

A beautiful damsel of Natchez,
Went roaming through nettlewood patches,
Now she sits in her room,
With a heart full of gloom,
And scratches, and scratches, and scratches.

## COMPRESSED AIR IN RAILWAY SHOPS.

We append hereto portions of a discussion following the reading of a paper entitled "The Proper Installation and Use of Compressed Air in Railway Shops and Manufacturing Establishments," by Mr. W. P. Pressinger, before the Central Railway Club, of Buffalo, N. Y. The paper appears in full in the June issue of *Ideal Power*.

### TIGHT PIPES.

Mr. J. O. Gould—We have a number of miles of our air piping under ground. In laying the same out, we divided it up in sections by placing valves so we could test out with pressure gages. We pump the line up to pressure, then close the several valves and shut down the compressors with the gages on at different points. If there is no perceptible drop we are satisfied that the lines, valves, etc., are tight.

### OIL FOR PNEUMATIC TOOLS.

Mr. C. H. Potts—I notice the author says in his paper that he uses oil for submerging his tools. I would like to ask what kind of oil he has found the best? Also, the best lubricant for lubricating pneumatic tools after they have been taken from the oil bath?

Mr. Aldcorn—We generally use kerosene for the baths in which the tools are immersed and blow them out in the morning. Every company has its own oil. Different kinds are made. We use an oil made by the Galena Company called airoline. It is a light oil and will not congeal in the tools—that is, for the hammers. We also use for the drills a grease made by the same company, which is not a fluid oil.

### INSUFFICIENT COMPRESSOR PLANT.

Vice-President McKenna—One part of this paper refers to the installation of the air plant. I think any of us who have visited any plant of any size have been impressed with the fact that it resembles to a great degree a sort of a crazy-quilt affair. I mean that apparently no complete design of the plant has been made in the first place; it has been a case of patchwork. The amount of air to be consumed at any shop or any plant for a certain period of time is the first matter to be taken into consideration. The trouble is that we are very apt to figure that it will take about so much air. Then we figure on a compressor about one-half of the size, feeling that the work will be intermittent in its character. The result is that we gradually add to the use of our air plant, and in a short time we find ourselves seriously handicapped by the lack of it. Carefully prepared plans should be made, keeping in view the actual requirements at that time. Then, owing to the increased consumption which will certainly develop later on, and by the installation of large compressors and large pipes, I think the results will be much more satisfactory than are obtained at the present time in many plants. In laying out pipe lines, either in shops or in yards for testing, means should be provided for return movement. Plants are often seriously handicapped by depending on the one main line. In the event of accident no means are provided for carrying on the use of the air. The piping should be laid off in sections, with suitable valves, which not only gives the benefit of the air being available in every direction, but also, as has been referred to here, testing up in certain sections becomes possible.

### CARE OF PNEUMATIC TOOLS.

Mr. Hogan—The care of tools is something that is very interesting to watch. Some time ago at the Depew shops we were not getting the service we thought we should from the air tools we were using. Our general foreman looked into the matter and found that they were not given the care and attention they should have, particularly in the way of lubrication, they were wearing out very fast, and they were thrown about promiscuously as though they were not valuable. But after we took the matter in hand and organized a system of caring for them it increased the efficiency of the tools and the output of the shop.

Mr. McKenna has touched on a very important point in connection with the use of air, *i. e.*, proper installation, piping, etc. We know, too, from experience, that good results can be obtained from installing re-

turn pipes or putting in valves that will permit of control of different sections throughout a large plant, particularly in case of accident.

Compressed air is indispensable so far as large shops are concerned, but it is costly if not properly looked after. No matter how large a compressor we install, if we permit leaks to develop and give them no attention, it costs considerable money to compress air. The proper methods for producing air, and utilizing it after it is produced, have been pretty well developed. It is now up to us to give them proper care.

Mr. Wanamaker—I would like to ask Mr. Aldcorn how often air tools should be oiled while in use?

Mr. Aldcorn—That is another thing that depends on the air you are using, whether your air is moist or dry. If you are using air that has no moisture you might have to oil—well, take a drill; if you are using grease in it or solidified oil, about twice a day. A hammer ought to be oiled oftener, because you use very light oil in it—probably three or four times a day. Our experience has been that if you use an oiler or atomizer, so that you can feed the oil in steadily you will get better service out of your hammers and they will last much longer. We mention that in the paper, the using of an oil cup to atomize the oil into the hammer. Of course you cannot do that with a drill because it takes so much more.

Mr. E. A. Miller—I do not think too much can be said in regard to the merits of compressed air in our shops. As Mr. McKenna has said, our air plants have, like Topsy, "just growed," without much system or regularity, and there are very few shops today that are using their air plants to the best advantage, especially from this cause. The proper way to find the leaks is to have the plant provided with stopcocks so that it can be divided off into sections, and frequently, in the evening, when the shops are closed, or at such times as it may be found best, to have the lines pumped up to full pressure, the pumps stopped and let the gage show to what extent there are leaks. Then let the inspector close the shut-off cocks of different sections of the pipe, apply a gage to each section, until the part of the pipe where the leaks have developed is shown. That saves an inspection of the entire plant because it locates the leak in the section of the plant without going over the whole plant. By doing this the pipe lines can be kept up with the minimum amount of labor. Another thing that is very essential at the present time is the educating of men to the necessary care of closing valves and cocks and connections to avoid the waste of air when they are not using it. Men generally consider that air doesn't cost anything. It doesn't as we breathe it, but it does when it takes coal to compress it. The importance of educating men to the proper handling of the air is one of the problems that we have before us at the present time.

The problem of getting plants systematically and properly installed is another important matter that we have before us. It is so easy for the foreman of some department who wants air some place to get pipe, possibly from the scrap pile, put in his connection and install his air plant. In a very short time it is wasting more air than the plant is worth. Then, too, we must understand that many men are being benefited by the air who have never given any thought to the economical side of anything connected with machinery. For instance the laborer is benefited by the use of air as well as the high-priced mechanic. I remember when I was working at the vise that about the hardest part of the labor I found in fitting driving boxes was placing them on and off the axle to try them. Now the man touches the valve and the air lifts the driving box and places it on the axle in much less time than he could lift it by hand. The men have had no knowledge of the economy that should be practiced in watching for leaks and economically using the air. Air is being applied in many ways to lighten labor and quicken work, from the highest priced mechanic down to the cheapest labor that we have. The important thing is to use the air sensibly; to head off the fellows with all sorts of fads and fancies who could do

the work quicker and better without the air. To use the air economically he should have the plant provided with necessary valves and proper couplings; divide it up into sections, that it may be inspected quickly to determine whether there is a leak, and if there is a leak to know in what section it occurs. These are the important points.

Then take care of the tools. I am glad that emphasis has been placed by so many of the speakers today upon the care of pneumatic tools. The first hammer that we used cost $110. You can get such a hammer now for $60 or $80. But they were new at that time, and when we made the requisition I said to the storekeeper: "Now, when that hammer comes let me know; I want to see it." A few weeks later he came into my office carrying the hammer in one hand and the bill in the other. He said: "Here is one of the fixtures for that hammer, but the hammer hasn't shown up yet." "Well," I said, "that is the hammer." He exclaimed, "My goodness! you say that little thing cost this amount of money?" holding up the bill for $110. "Yes," I said. "Well," said he, "I don't understand it." "No," I said, "I suppose not." Now there are many people just like that storekeeper. They don't understand the pneumatic tool. They don't understand that in that simple little tool there is $110 or $140 worth of machinery. They throw it around, taking no more care of it than they would of a monkey wrench or a common chipping hammer that they use every day. It is incumbent upon those in charge of plants to educate men to the importance of taking care of these tools just as they would of any high-class machinery or of our plants, and also to teach them to use the air sensibly in all varied work.

RECEIVER CAPACITY.

Mr. J. P. Wright—Speaking of the main air line I would call attention to the fact that it should have proper reservoir capacity. The air pipes should be large, so that you can always depend upon them for a reservoir when you have an unusual draft upon your power. Besides that, you can get a better joint with a big pipe. These air systems are usually installed by contract. The contractor cannot cut down the size of the compressor specified, but he can and he does cut down on the size of the pipe. This is where the fault comes in in the installation, and where most of the trouble occurs later on.

EXPERIENCE WOULD DOUBLE CAPACITY.

Mr. Aldcorn—I would just like to say a word about installation. If people putting in air plants would call in people of experience it would save them much trouble. Our practice has been, if a man asks our opinion, to tell him the experience of others; that is, of putting in too small a plant. We advise him to put in a compressor of probably twice the capacity he seems to need at first. If he has any sort of plant we will guarantee that within a year we will have another one just the same size. Where one very large compressor is required we advise that it be installed in two units, which I think is a great deal better. You can't put in too large a pipe line, but you can put it in too small. You cannot give your pipe line too much care, as to leaks, etc.

I have in mind one plant that has 16,000 feet of free air a minute going through the mains every day in the week. They use an 18-inch main line through the yard, and their branches are 6-inch. These lines are tested once a day. They have one man who does the testing and nothing else. He does it at the noon hour, the main line first, shutting off all others, and of course pumping up and having full pressure on the receivers. They have receivers with pressure gages all over the yard. After testing the main line he tests each of the outlets, one after the other. If he finds a leak it is repaired at once. The president of that company told me that man pays his salary ten times over. You know it takes about one horsepower to compress five cubic feet of free air per minute to 100 pounds; also that a little hole, a sixteenth of an inch in diameter, will leak out a horsepower.

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Life's riches are in the fine dust of daily kindnesses rather than in the great nuggets of public charity.

# IDEAL POWER

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Send 25 cents and have your name put on our subscription list.


Summer has gone
Every factory is busy
Prospect is bright
Trade is brisk
Enough work for all
Many golden opportunities
Business is rushing
Earners are satisfied
Rejoice and be glad

**Ideal Power's New Dress.**

The bellows was the original air compressor, and the wind mill was the first air motor. By placing both in the hands of a child the artist has produced an attractive cover design for *Ideal Power*. How do you like it?

**Chicago to New York in Three Hours.**

George L. O. Davidson of Denver, says he is almost ready to start his flying machine and act as sky pilot of the birdlike structure he has invented.

Davidson has long been known for his work in attempting to perfect an airship. He claims to have done so now. His ship has no balloon, and is heavier than air. It is kept up by two horizontal rotary wheels, steered vertically by a tail which is lowered or raised as the ship descends or rises, and guided laterally by a beaklike rudder in front which is turned to the right or left. The rotary wheels lift as they revolve, pushing the ship up. The machine weighs 100 tons, will carry 100 passengers, and make the journey from Chicago to New York in three hours, so the inventor claims.

**Trans-Atlantic Wireless, Oct. 1.**

According to newspaper dispatches from London, William Marconi is to inaugurate transatlantic wireless telegraph service October 1. It is expected that all preparations will be completed by that time. A satisfactory exchange of messages, say officials of the company, have been made between the Irish station at Clifton, and the Canadian station at Cape Breton. The rates will be ten cents per word, plus the land charges for transmission.

**A 2,000,000 Candle-Power Arc Lamp.**

Among the exhibits at the New York Electrical Show, which opens in Madison Square Garden, September 30, and closes October 9th, will be a 2,000,000-candle power arc lamp elevated in a specially constructed tower in the center of the garden. Recently Mr. Scott, of the Scott Electric Company, inventor of the light, made a successful test with a 300 000 candle-power arc lamp, and thereupon decided that the power could be raised to 2,000,000.

Reports from 30,000 banking and mercantile correspondents of the Commercial National Bank of Chicago, show unanimity in the opinion that business conditions are sound and satisfactory.

### C. & N. W. R. R. Engineering Feat.

An engineering feat that attracted considerable attention was accomplished Sunday, September 2, when the Chicago and Northwestern Railroad cut off one-third of its draw bridge crossing the Chicago river near the train entrance to the Chicago station.

In order to give 100 feet of clear channel in the north branch of the Chicago river the Chicago and Northwestern will replace the riveted latticed swing bridge with a double track Strauss bascule bridge.

It was decided in building the new bridge to place it on the south side of the present bridge, locating the single trunnion pier on the east side of the river. To allow space for constructing this pier it was necessary to cut off a portion of the east arm of the swing bridge, so that it would clear the new pier and new bridge, which will be erected in a vertical position. A temporary trestle was built on the east side of the old pivot pier to take the place of that portion of the east arm which was cut away. The bridge, after the removal of the east portion, was balanced by a counterweight of 165 tons of pig iron. The work of cutting off the arm was done with hack saws and air drills manufactured by the *Chicago Pneumatic Tool Company* were used to drill tangent holes to part the cords.

The work was begun at 9:40 a. m. and the bridge was opened again for traffic at 5:30 p. m., but seven hours and fifty minutes being consumed in the work.

The work was prepared under the direction of E. C. Carter, chief engineer of the Chicago and Northwestern, and was in charge of W. H. Finley, assistant chief engineer, assisted by I. F. Stern, engineer of bridges. W. L. Curtis was resident engineer and J. F. Farrelly electrical engineer.

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### Benjamin Franklin Outdone.

In Blue Mountain, Maryland, resides a gentleman named Blatz, who conceived and carried out the idea of constructing a lightning accumulator. He built a plant equipped with storage batteries, and rigged up huge kites, which carried wires into the clouds. The wires he connected to his batteries, and then sat down to wait for an electrical storm. It came. There was a flash and shot of fire came down the trunk wire. The electricity overcharged the storage batteries, and the surplus current hunted up Mr. Blatz. It doubled him into a loop knot, and when revived his right arm and two ribs were broken.

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### Physical Impossibility.

A teacher in one of the country schools had a class of young children in mathematics before her. The examples were in addition and she propounded this question: "Now, children, if I lay four eggs on the desk, and Sam," pointing to a freckle-faced boy at the head of the class, "should lay three, how many would there be?"

The bad boy, who was at the foot of the class, had been listening intently, and shouted out, "Go on, Sam, take her up. She can't do it."—R. S. F. in Lippincott's.

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### Breaking It to Him.

"Doctor, I suppose I'm an old fool, but I have made a discovery that gives me some uneasiness."

"What is it, Kadger?"

"I was passing my hand over my head the other day, and a found one place that's a good deal hotter than any other spot. I thought it was all imagination at first, but it isn't. Put your hand on the top of my head, pretty well back. There, that's the place. Doesn't it feel hotter than the rest of my head?"

"It certainly does."

"Well, now, I am anxious to know what that means. If it indicates that there's too much brain pressure at that particular spot, I want to know it. Is it serious?"

"Kadger, it is."

"I feared so. Tell me the truth, doctor, no matter what it is."

"I hesitate to tell you because—"

"Doctor, I insist on knowing."

"Well, if you must know, Kadger, that particular place on your head feels hot to your hand because you're getting a bald spot there."—Chicago Tribune.

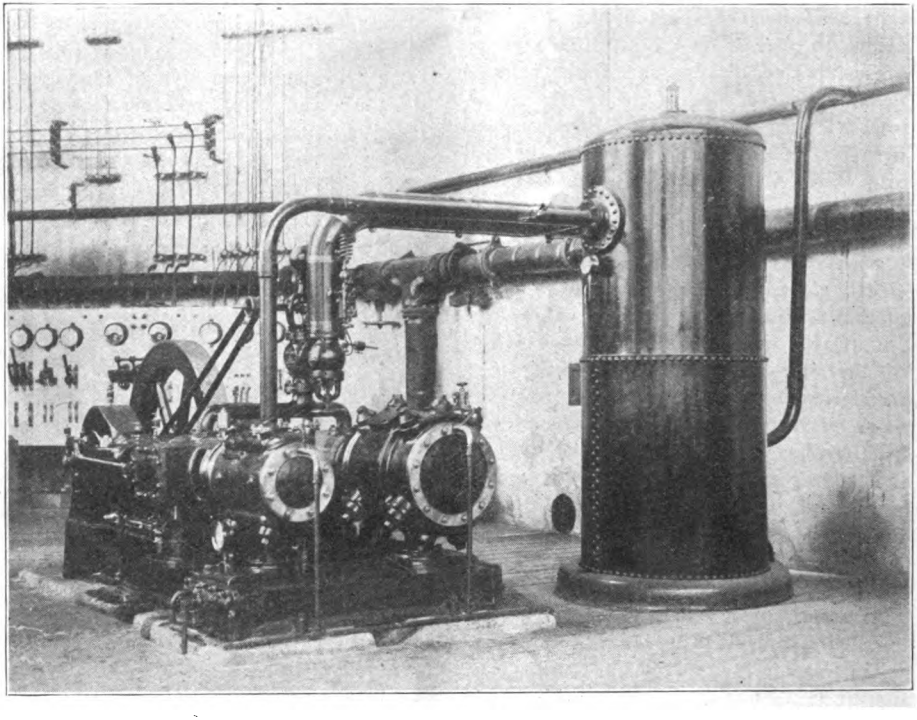
**Pneumatic Tools on Egyptian State Railways.**

The Consolidated Pneumatic Tool Co., 9 Bridge street, Westminster S. W. London, England, representative of the *Chicago Pneumatic Tool Company,* has sent us the accompanying photograph showing a *Franklin Air Compressor* and air receiver recently supplied by them to the Egyptian State Railways at Boulac, Cairo.

In addition to the compressor a complete equipment of pneumatic tools, manufactured by the Chicago Pneumatic Tool Company are in use. The list includes the following:

1 No. 0 reversible drill.
4 No. 1 reversible drills.
5 No. 2 reversible drills.
2 No. 3 L. G. drills.
2 No. 4 L. G. drills.
2 No. 80 Boyer longstroke hammers.
2 No. 5 Boyer longstroke hammers.
2 No. 2 Boyer chipping hammers.
3 No. 1 Boyer chipping hammers.
1 No. 3 Boyer chipping hammer.
4 Holdderons.
2 No. 2 Boyer drills.
2 No. 3 Boyer drills.
1 No. 0 Boyer hammer.
1 No. 90 longstroke hammer.

The operation of this plant has proven so satisfactory that another large order is expected from the same company.



Franklin Air Compressor on Egyptian State Railways.

**Where to Go.**

When I asked her to wed, "Go to father," she said;
And she knew that I knew that her father was dead.
And she knew that I knew what a life he had led.
And she knew that I knew what she meant when she said,
"Go to father."

# TERSE TIMELY TOPICS

They are making artificial marble from cement in France.

On an average a new building has been finished every forty-five minutes in San Francisco since the fire, says the San Francisco Magazine.

According to statistics recently published in German the United States exceeds in mileage of railroads any other country in the world, also that of entire Europe.

The production of acetylene gas without water is now said to be possible, calcium carbide shaken with dry soda crystals being found to generate gas freely.

It is scarcely possible to stand upon any corner in the business districts of Greater New York without finding some specimen of reinforced concrete construction within range of vision.

The lowest submarine so far is the "Octopus," which stayed down thirty-nine minutes in 215 feet of water off Boston Light Although the pressure at that depth was enormous it did not leak.

Asbestos, used for fireproofing purposes, has been found near Republic, Mich., and in the serpentine rocks north of Ishpeming. Marquette iron range, but the deposits have never been opened, although the mineral fiber is said to be of commercial grade.

According to the Ironmonger, Mr. E. L. Rinmann, of the University of Upsala, claims to have discovered a new process for the electrical extraction of aluminum from blue clay, by which the cost of production is reduced to about one-quarter of the present rate.

A burglar in Germany cut a hole through the ceiling above a safe, lowered a complete blow-pipe apparatus, including an acetylene generator and two cylinders of compressed oxygen through the hole, and by its use melted away enough of the door to give access to the interior.

Tantalum is so hard that the only effect produced by a diamond drill, worked day and night for three days on a sheet of the substance one-twenty-fifth of an inch thick, with a speed of 5,000 revolutions per minute, was a slight dent in the sheet and the wearing out of the diamond.

Lifting magnets are coming into increasing use in British iron works. Castings weighing two to three tons are lifted by electro magnets. Much time is saved in comparison with the use of hooks, slings, and other devices, as the mere throwing of a switch energizes the magnet.

Railway Statistics from advance sheets of "Poor's Manual" show that the average receipts per passenger-mile in 1906 were 2.011 cents, as against 2.028 cents in 1905. The average revenue per ton-mile in 1906 was 0.766 cent, as against 0.784 cent in 1905. At the close of the year there were 222,635 miles of railway.

The Federal Government is about to excavate a channel through which it is expected that within three years large ocean steamships may unload their cargoes at wharfs at Newark, N. J. The sum of $500,000 was appropriated for the work at the last session of congress and $250,000 of that amount is available now.

Members of the U. S. Geological Survey, who are now in San Francisco, are investigating the recent discoveries of platinum in several counties in California. The investigation developed that there is platinum in 120 places in the United States; but that some of the largest and most profitable fields for commercial exploitation are in Del Norte, Siskiyou and Trinity counties, in California.

Ground was broken for one of the greatest engineering projects of the age on June 20 near Cold Spring, N. Y., west of the Hudson river. Immense reservoirs are to be constructed in the Catskills and an aqueduct is to bring water from there to the city of New York. It is estimated that the work will cost in the neighborhood of $160,000,000 and will increase the present Croton supply 500,000,000 gallons daily.

Charles L. Tutt, a wealthy Colorado miner, purchased an island in San Juan group in Puget Sound, intending to build a home on it. When he went to examine his purchase it was not there. Investigation proved it had completely sunk during the San Francisco earthquake. Recently, however, the island again arose to the surface. All trees and foliage on it were dead. Tutt promptly christened it Denver Island.

The Illinois Tunnel Company of Chicago, running the elaborate system of tunnels under the city streets—eighteen east and west and twelve north and south—announces that by Nov. 1 the tunnels will be carrying freight from and to the freight houses of the twenty-three railways entering the city. Underground connections with the depots are about completed as well as connections with a number of the leading wholesale and retail business houses.

"Something New in Automobiles" is the title of a pamphlet by Dr. J. H. Brechhold, of Frankfurt. It gives a detailed account of a motor car in which the motive power is carbonic acid gas.

One of the advantages is that the carbonic acid gas, after being used, is again returned to the cylinders and is used over and over again. The cylinders are constructed exceedingly strong to resist the tremendous pressure to which they are subjected.

The one great danger, explosion in case of collision, the writer says, makes the invention impractical for the present, but he hopes that this source of danger will be overcome.

**Cement Shingles Cheaper Than Wood.**

The use of cement for replacing articles made of wood is increasing every day. Cement has already replaced wood, to a great extent, in building sidewalks, bridges, fence posts, steps, building walls, foundations and many other purposes and is commanding considerable attention at present in the form of shingles. In the earlier instances of concrete roofing the material was used in the same manner as in laying a floor, but the great strength required in a floor is not necessary in a roof. The cement shingles are only a little heavier than the best wood shingles, and, as they are practically indestructible, they are cheaper in the end than any other material, including tile and slate. These shingles are made in a great variety of designs and are reinforced with metal skeletons, which hold the cement together and terminate in loops at the edges for nailing to the roof. They are practically everlasting, as moisture, the cause of universal decay, is the chemical agent in the process of hardening cement and when properly mixed and tempered the cement shingles become harder and more durable the more they are exposed to the weather.—*Pop. Mechs.*

**Hardly Qualified.**

Mrs. Dugan—"So Denny's working for the big 'litrical company, I hear."

Mrs. McGinnis—"He is thot, an' doin' foine."

Mrs. Dugan—"I suppose he'll be puttin' 'lectric light in yer own house now?"

Mrs. McGinnis—"Not for a whoile yit. He's not an ixpert; he's only an armature."

**The Habit.**

Howell—A good deal depends on the formation of early habits.

Powell—I know it; when I was a baby my mother hired a woman to wheel me about, and I have been pushed for money ever since.—Tit-Bits.

Casey's remark upon seeing the first rattan chair was characteristic. He said: "Well, the felly thot made thot had plinty iv patience, gatherin' together all iv thim little holes and puttin' straws about 'em."

**Good Fellows.**

Here's to all good fellows, friends,
In this world and the next;
A toast I drink to you tonight—
Good fellowship's my text.

Not he who calmly takes your hand,
In an idling hour you know;
Not he who slaps you on the back
As long as the highballs flow—

But the chap who speaks the kindly word
When things have all gone wrong;
The fellow that smiles as he grasps your hand
And tells you life's a song.

What if you know the sucker lies—
What if he knows it, too;
There are times in life when the friend that lies
Is the only friend that's true.

Cavil and rant, ye prudes that will,
Of the evils of wine and gin—
But somehow the real true things we feel
Slip out when the wine slips in.

The fool is a fool and the cad is a cad,
Whichever God means him to be,
But the man that's a man won't forget he's a man,
Though he's out on a hell of a spree.

So drink to this toast from your hearts, my friends,
From a heart to a heart let it run—
Here's to good fellows all over the world—
Their health, and God bless every one!

**Johnny Knew.**

Sunday School Teacher—Some little boys are good and some others are bad. What kind go to heaven?

Small Johnny—Dead ones.—Chicago News.

An Iowa man had a cat that he did not want. Therefore, he took the cat twenty-four miles into the country, locked him in a barn, and started for home. When he arrived home the cat was not there, and, what is more, has not come back at all!


High living is frequently the cause of low spirits.

He knows not the value of flowers who never studied botany.

Many a family tree has a bad branch and a shady reputation.

It's easy to get all the credit you want when you don't want it.

It isn't necessary to put up an umbrella when silence reigns.

But few men are able to retain their self-conceit after marriage.

A man isn't necessarily two-faced because he has a double chin.

A man's idea of a close friend is one who will loosen up occasionally.

It isn't what a man owes, but what he pays that keeps him poor.

After all, a woman's effort to beautify herself is but a vain attempt.

Only a man with a poor memory forgets one minute what he says the next.

The man who is his own worst enemy is acquainted with a lot of bartenders.

Some spinsters advance step by step until they finally become stepmothers.

The goose does not understand why a dog should wear hair instead of feathers.

A man's popularity is frequently due to the fact that he isn't aware of it.

From the bunko man's point of view the beauty of a farmer is but skin deep.

Women ought to make satisfactory angels because they are so fond of harping.

Cupid and coffee cause a lot of heart trouble—and both have grounds for it.

A crank is a man who knows all about a subject which you know nothing about.

The easiest way to do a thing may not be the best, but it is the most popular.

When the unexpected happens a man's true nature begins to show on the surface.

The scenery along the straight and narrow path is less attractive than that bordering on the broad road leading elsewhere.

The door on the business office is marked "push." The dor on City Hall is marked "pull."

Our idea of strong will power is that of a man who can fast until he starves to death.

Weddings resulting from chance acquaintances may well be listed under the head of "casualties."

Humility is one of the ingredients a self-made man occasionally forgets to mix with his material.

Anybody can play a hand organ, but there is no good and sufficient reason why anybody should.

No matter what you may think, a yellow streak in a man doesn't add to the beauty of his color scheme.

When a man begins to get up at 6 o'clock on Sunday morning he may as well admit that he is growing old.

Fireproof writing paper is the latest novelty. This makes it all the more dangerous to be a statesman.

When one comes up to the mark he has set for himself it is a safe conclusion that the standard was too low.

There are a lot of fellows puzzling over the next world who should give a little more attention to this one.

A man can run a store without advertising and he can wink at a girl in the dark—but what is the use?

The man who insists on calling a spade a spade leaves a lot of raw spots on those with whom he comes in contact.

When you're in the right you can afford to keep your temper, and when you're in the wrong you can't afford to lose it.

Words sometimes fail a man, but nothing like that ever happens to a woman until she is ready to attend her own funeral.

A writer in "Outing" says it is not at all painful to starve to death. Most literary men are competent to deny that assertion.

The way to the Hall of Success may be pointed out, but the door must be opened by each man for himself if he would enter.

A lot of valuable time is wasted in trying to make people over into what you think they should be instead of taking them as they are.

**Utilizing Exhaust Heat of the Gas Engine.**

Very few of the users of small gas engines realize the vast amount of heat that is carried away in the exhaust. The gases in the cylinder easily reach a temperature of 1,500 degrees Fahrenheit, and fully one-third of their heat is wasted. Steel manufacturers are now utilizing blast furnace gas, which formerly went to waste. Why is it not just as practical to use the hot exhaust gases from an engine cylinder?

The man who has a small pattern or machine shop, deriving his power from, say a 20 horse power gas engine, can economize materially on his winter's fuel bills for heating. Usually he keeps three or four large open stoves going all the time, fairly eating up the coal, and only heating the shop in spots. If he will use his exhaust, he can obtain an even temperature all over the room and at the same time not burn any solid fuel.

If the shop is not too large and spread over too much area, it can be piped for hot water, with the circulating pipes running into a coil. This coil is placed within a metal drum or box properly protected with asbestos or some other heat insulator. If the engine exhaust is carried into this box or heater, it will heat up the water in the coils, thus starting through the pipes a circulation which will be constant. After the gases have become cooled in the heater, they can escape to the atmosphere through a waste pipe.

In a small pattern or wood working shop, where the size of the engine is too small to be used for heating purposes, it can be utilized for a number of things; for example, the heating of glue. To accomplish this result, lead the exhaust into a larger pipe or water tight box surrounded by the glue pot water. The hot gases will pass into this space, give up their heat to the water and finally escape to the atmosphere through the outlet.

There is another advantage in thus using the waste heat. When the engine exhausts into a large box or receptacle, placed as near as possible to the engine, it acts as a muffler and silences the explosion without producing any back pressure in the cylinder.

The examples enumerated are but two of several uses to which the heat of this waste gas can be put by adapting apparatus to each local condition. It can even generate steam if a suitable boiler is attached. By utilizing this heat, men who previously barred from using the gas engine on account of the necessity of having steam for their work, can install gas engines in their plants, and at the same time have steam for drying, seasoning or any other use, without maintaining a separate boiler.—A. K. Reading in the American Machinist.

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**Letters That Pull.**

Here is some good advice given by Sherwin Cody, the authority on letter writing:

Letter writing is a distinct art, built principally on applied psychology. A good letter makes a sharp impression at the right place and at the right time. A bad letter lessens the impression that may have been created by a first and stronger one. Two weak letters following one strong one will make no impression whatever.

This is what Mr. Cody says:

"Write a long letter to

"A farmer,

"A woman,

"A customer who has asked a question,

"A customer who is angry and needs quieting down and will be made only more angry if you seem to slight him,

"A man who is interested but must be convinced before he will buy your goods.

"Write a short letter to

"A business man,

"An indifferent man upon whom you want to make a sharp impression,

"A person who has written you about a trivial matter for which he cares little,

"A person who only needs the slightest reminder of something he has forgotten or of something he may have overlooked."—The Business Monthly Magazine.

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A citizen was accosted recently by a beggar who said, "Mister, please give a poor blind man a dime." "But you can see with one eye," he answered. "Well, gum me a nickel then," was the reply.

### Recovery of Copper from Scrap.

A comparatively new industry has sprung up in the refining of non-ferrous scrap metal and the present high prices asked for all metals of this class has led to unusual activity in the scrap market. Scrap producers are anxious to realize on their waste metal and competition is keen for the purchase of raw material by the refiners. Copper is getting its due share of attention, and some care is necessary now in handling the ever increasing traffic in copper and brass scrap.

Brass and other alloy scrap is recovered by remelting in crucibles with new metal. Fine particles of brass, such as occur in ashes, skimmings and sweepings are recovered by a system of washing and jigging. Concentrates obtained from jigging processes are smelted in a reverberatory furnace, or they are melted down in crucible or oil burning furnaces and cast into ingots.

Copper scrap is treated differently according to the character of the material. The copper may be in the metallic state, as in trimmings from copper sheet, borings, grindings, punchings, etc., or it may exist in chemical combination with some other element, as in copper scale or blue vitriol.

Metallic scrap copper may be melted in reverberatory furnaces of similar design to those used in the copper mining districts. The slag skimmed off consists of impurities originally contained in the charge, and combinations of copper with oxygen and the firebrick lining of the furnace. The slag may contain from 30 to 70 per cent copper, which is recovered by smelting in a cupola or small round water jacketed blast furnace.

Certain processes of manufacture yield some very dirty scrap mixed with grease and refuse, which appear almost worthless. If the metal is present in paying quantities, however, it can be recovered, no matter how much polluted, by a judicious system of drying, sorting and smelting. The Allis-Chalmers company builds a complete line of concentrating, refining, separating and smelting machinery for use in reducing scrap, as well as for every sort of mining and reduction processes.

### Women and Feathers.

Professor Starr, the famous entomologist, was in his humorous and whimsical way accusing woman of barbarism.

"And she is not only barbarous—she is illogical and inconsistent!" he exclaimed.

"I was walking in the country one day with a young woman. In a grove we came upon a boy about to shin up a tree. There was a nest in the tree, and from a certain angle it was possible to see in it three eggs.

"'You wicked little boy,' said my companion, 'are you going up there to rob that nest?'

"'I am,' replied the boy coolly.

"'How can you?' she exclaimed. 'Think how the mother will grieve over the loss of her eggs.'

"'Oh, she won't care,' said the boy. 'She's up there in your hat.'"

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### New Style in Trousers.

"A young man visited the tailor the other day and said:

"'I'm a rower, and I want to be measured for two pair of rowing pants—the kind with the sliding seats.'"—Los Angeles Times.

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### Giving It Away.

The Young Man—"Dicky, you think a good deal of your sister, don't you?"

Dicky (entertaining him)—"You bet! So does ma and pa. She's been in the fam'ly mighty near forty years."—Exchange.

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### The Answer.

"What is the best thing for chicken lice?" asks an Oklahoma man. "Young chickens," answers the editor of the local newspaper.

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Wife (during the spat)—"I don't believe you ever did a charitable act in your life."

Husband—"I did one, at least, that I have lived to regret."

Wife—"Indeed! What was it, pray?"

Husband—"I saved you from dying an old maid."

# IDEAL POWER

Published Monthly in the Interest of Compressed Air and Electrical Appliances
By THE IDEAL POWER PUBLISHING COMPANY
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## Unique Compressed Air Plant

The photo shows a rather unique compressed air plant, and a few words describing the conditions and development, and the use to which the converted power is put, may be of interest.

The plant is located on historic Belle Isle, at Richmond, Va., in the mill of the Old Dominion Iron & Nail Works Company, the air compressor being driven by an old water-wheel or turbine, which became available by the abandonment of the cut-nail department.

The concern was established in the year 1830 and is, therefore, one of the oldest in the United States. Originally its sole article of manufacture was cut nails, but in later years this article has been abandoned as noted above. Its chief manufactures now are bar iron, borseshoes (the celebrated Hammer brand), railroad spikes, quarry cars, etc. Its stay-bolt iron is one of the highest products known of its kind in refined bar iron, taking the highest award at the St. Louis Exposition in 1904. The company owns and operates extensive granite quarries, mainly for which the compressed-air plant was installed.

The compressor, a *Franklin* 28 x 16½ x24 two-stage machine, with separate inter cooler, manufactured by the *Chicago Pneumatic Tool Company* furnishes air through a 4-inch pipe line to the quarry about 1,200 feet away, compressed air having superceded steam entirely in this department. The stone crushing plant, consisting of two stone crushers, one a Gates No. 6 and the other a McCully No. 4, elevators and hoists, and the usual screening machinery, are operated by the same 80-horsepower steam engine as originally, the engine having a slight modification made to its slide valve, the steam engine now having become an air engine. The cable-way engine, derrick engines and steam pumps have also been so treated, receiving the same cold deal. An ingenious reheater has been installed in the engine room, and the two boilers, of 90 H. P. and 60 H. P. respectively, are now being used as air receivers. In use in the quarry are five rock drills and one *"Baby Giant" Rock Drill,* manufactured by the *Chicago Pnuematic Tool Company.*

In addition to the above uses of compressed air, one *"Little Giant" Drill* and three *Boyer Hammers* are in use in the manufacture of quarry cars.

The saving in the quarry and stone department is considerable, possibly 600 tons of coal per year and wages of a fireman and engineer, besides placing air pressure available for other uses.

Some of the general history of the works which were established in 1830 as before noted, and of the iron industry may be of interest here. The first iron works in America were built in 1612 on Falling Creek, a tributary of James River, in Ches-

W. C. Brown, New York City; Secretary, W. F. Allen, 24 Park Pl., New York City.

American Railway Engineering and Maintenance of Way Association—President, H. G. Kelly, M. & St. L. Ry., Minneapolis, Minn.; Secretary, E. H. Fritch, 962 Monadnock Block, Chicago, Ill.

American Railway Master Mechanics' Association—President, J. F. Deems, N. Y. C. & H. R. R. R., New York City; Secretary, J. W. Taylor, 390 Old Colony Building, Chicago.

American Society of Mechanical Engineers —President, Fred W. Taylor, Philadelphia, Pa.; Secretary, Prof. F. R. Hutton, 12 W. 31st St., New York City.

American Society of Railroad Superintendents—President, W. L. Derr, Erie R. R. Elmira, N. Y.; Secretary, C. A. Hammond, Mt. Vernon, N. Y.

American Street and Interurban Railway Association—President, W. Carl Ely, Buffalo, N. Y.; Secretary, B. V. Swenson, Engineering Societies' Building, 29 West 39th St., New York City.

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Canadian Association of Stationary Engineers—President, Chas. Mosely, Toronto, Ontario, Canada; Secretary, W. Inglis, 554 Bloor St., Toronto, Ontario, Canada.

Canadian Roadmasters' Association—President, A. McAlley, Can. Pac. Ry., Toronto Junction, Ontario, Canada.

Car Foremen's Association of Chicago—President, O. M. Stinson, Swift Refrig. Line, Chicago, Ill.; Secretary, Aaron Kline, 326 N. 50th Ct., Chicago, Ill. Regular meetings second Wednesday in each month at 8 p. m., Room 2.

Engine Builders' Association of United States—President, C. A. Gates; Secretary, J. I. Lyle, 59 Courtland St., New York City.

International Railroad Master Blacksmiths' Association—President, J. S. Sullivan, P. R. R., Columbus, Ohio; Secretary, A. I. Woodworth, C., H. & D. Ry., Lima, Ohio.

International Railway General Foremen's Association—President, C. A. Swan, Fisher Bldg., Chicago, Ill.; Secretary, E. C. Cook, 405 Grand Central Station, Chicago, Ill.

International Master Boiler Makers' Association—President, George Wagstaff, New York Central Lines, Buffalo, N. Y.; Secretary, Harry D. Vought, 62 Liberty St., New York City.

International Union of Steam Engineers—President, Matt Comerford, 595 East Seventh St., Brooklyn, N. Y.; Secretary, Robert A. McKee, 606 Main St., Peoria, Ill.

Master Car and Locomotive Painters' Association—President, J. W. Houser, C. V. R. R., Chambersburg, Pa.; Secretary, A. P. Dane, B. & M. R. R., Boston, Mass.

Master Car Builders' Association—President, W. E. Fowler, Can. Pac. Ry., Montreal, Que., Canada; Secretary, J. W. Taylor, 390 Old Colony Bldg., Chicago, Ill.

National Association of Cement Users—Secretary, W. W. Curtis, 344 Dearborn St., Chicago, Ill.

National Association of Stationary Engineers—Secretary, F. W. Raven, 315 Dearborn St., Chicago, Ill.

National Electric Light Association — President, Arthur Williams; Secretary, W. C. L. Eglin, United Engineering Societies' Bldg., 39th St., New York City.

Railway Signal Association—President, C. H. Morrison, Erie R. R., New York City; Secretary, H. S. Balliet, Grand Central Station, New York City.

Railway Store Keepers' Association—President, N. M. Rice, A. T. & S. F. Ry., Topeka, Kan.; Secretary, J. P. Murphy, L. S. & M. S. R. R., Collinwood, O.

Road and Track Supply Association—President, W. E. Clark, 401 Marquam Building, Portland, Ore.; Secretary, John N. Reynolds, Railway Age, Chicago.

Roadmasters and Maintenance of Way Association—President, C. Ruhrer, L. S. & M. S. Ry., Sandusky, Ohio; Secretary, C. E. Jones, C., B. & Q. Ry., Beardstown, Ill.

Traveling Engineers' Association—President, W. J. Hurley, N. Y. C. & H. R. R., Buffalo, N. Y.; Secretary, W. O. Thompson, R. W. & O. R. R., Oswego, N. Y.

Western Society of Engineers—President, B. J. Arnold, Chicago, Ill.; Secretary, J. H. Warder, Monadnock Block, Chicago, Ill. Regular meetings first Wednesday; extra meetings generally third Wednesday, each month, except July and August.

---

Take your inspiration to do things straight, as it comes into your own mind; it's a weak man who waits for ideas to filter through

---

It is strange how a man who can beat at almost any game of cards, cannot be induced to beat a carpet for love or money.

---

It takes a man longer to stop just a minute "to see a man" than it does a woman "to wait just a minute and I'll be ready."

---

Until automobiles can be operated with one hand the old-fashioned horse and buggy is good enough for a girl and her best beau.

---

British North America had 55 miles of railroad in 1850. In 1906 there were 22,000 miles in operation and many more under construction.

---

When a man goes wrong people say it was the devil in him, but we suspect that when the devil goes wrong his friends say that it was the man in him.

---

It makes a woman mad to find out that some of the things in which she was not interested have happened in the neighborhood without her knowing it.

---

There are two ways of going about your work "as if you owned the place," and the difference between them marks the distinction between the "officious" and the "efficient" man.

---

A boat that is propelled by fifty fins, twenty-five on each side, is the invention of Captain John Townsend, of Somer's Point (near Atlantic City). Captain Townsend, who has applied for a patent, in his experiments in the bays obtained a speed of nearly forty miles an hour with his new craft. The fins are arranged in rows and are operated by an ordinary gasoline motor. They are about two feet in length and sweep with a long stroke that fairly lifts the boat out of

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# Sherardizing, New Method of Galvanizing

Description of a Simple and Interesting Process with Many Advantages Over the Old Method

The deposition of a coating of zinc on iron or other metals by means of the new process called "Sherardizing" is worthy of the attention of all those who are carrying on or contemplating galvanizing. This process is the invention of Sherard O. Cowper-Coles, of London, England, and has been in use in that country for some time with excellent results. It is, metallurgically speaking, one of the most interesting processes which have appeared in some time.

The process is a very simple one, and consists in heating the articles to be galvanized in a closed iron receptacle, such as a tumbling barrel, with zinc dust. At the same time the barrel is heated to about 600 degrees Fahrenheit. This temperature need not be exact, and from 500 to 600 degrees answer the purpose. The thickness of the coating depends upon the length of time that the articles are allowed to remain in the barrel. Any desired thickness may, therefore, be obtained.

The castings are cleaned in any desired manner, either by pickling, tumbling, or the sand blast. This part of the process is the same as it would be for ordinary galvanizing or electrogalvanizing. They are then placed in a closed iron drum or barrel, which is so made that it may be revolved and heated by a muffle furnace or other means. In the illustration the drum and the method of heating it are shown. The articles, after they have been treated, are shown issuing from the drum. When the articles are placed in the drum, a quantity of zinc dust is placed in with them. This zinc dust is a commercial article, and may be cheaply obtained.

The process is based upon the fact that zinc volatilizes in an inert atmosphere at a temperature slightly below its melting point. The volatilized zinc, therefore, unites with the iron or steel (brass or copper may also be used) and forms an alloy with it. This allows it to adhere tenaciously. The zinc then continues to cover the surface until any desired thickness may be obtained. When finished, the articles are dumped out, sifted from the zinc dust, and are in a completed condition unless a highly polished surface is desired.

Material galvanized by this process has withstood five years of the most trying conditions. It has been found satisfactory to the British Admiralty, and also by the Colonial Government of the Gold Coast, where nothing but gun-metal or brass would withstand the severe conditions of the climate.

Tests which have been made of it by standard methods, or that known as the American telephone and telegraph test, resulted in a victory for articles that had been sherardized. Four dips in a sulphate

## CONVENTION DATES.

February 15-16-17-18-19, 1908—National Association of Railway Agents, Los Angeles, Cal.

February 20, 1908—Central and Western Association of Car Service Officers, Chicago, Ill.

February 20-21, 1908—American Association of Dining Car Superintendents, New York City, N. Y.

March, 1908—Eastern Association of Car Service Officers, 24 Park place, New York City, N. Y.

March 17-18-19, 1908—American Railway Engineering and Maintenance of Way Association, Auditorium Hotel, Chicago.

March 17-18-19, 1908—The Road and Track Supply Association, Auditorium Hotel, Chicago.

April 22, 1908—American Railway Association, New York City, N. Y.

April 29, 1908—Association of American Railway Accounting Officers, Washington, D. C.

May 26-27-28, 1908—International Master Boiler Makers' Association, Detroit, Mich.

May, 1908—International Railway General Foreman's Association, Chicago, Ill.

May 20, 1908—Freight Claim Association, Atlantic City, N. J.

May 25-26-27, 1908—Railway Storekeepers' Association, Auditorium Hotel, Chicago.

June, 1908—American Association of General Baggage Agents, Milwaukee, Wis.

June 9, 1908—The Air Brake Association, St. Paul, Minn.

June 9-13, 1908—American Order of Steam Engineers, Baltimore, Md.

June 16, 1908—Train Dispatchers' Association of America, Fort Worth, Tex.

June 17-18-19, 1908—Master Car Builders' Association, Atlantic City, N. J.

June 22-23-24, 1908—American Railway Master Mechanics' Association, Atlantic City, N. J.

June 23-26, 1908—American Society of Civil Engineers, Denver, Colo.

June 24, 1908—Association of Railway Telegraph Superintendents, Montreal, Can.

Aug. 18, 1908—International Railroad Master Blacksmiths' Association, Cincinnati, O.

September, 1908—National Association of Stationary Engineers, Denver, Colo.

September, 1908—The Traveling Engineers' Association, Detroit, Mich.

September, 1908—American Association of General Passenger and Ticket Agents, Toronto, Can.

September 12, 1908—American Association of Freight Traffic Officers, St. Louis, Mo.

September 14, 1908—International Union of Steam Engineers, Philadelphia, Pa.

October 6, 1908—National Convention of Railroad Commissioners, Washington, D. C

October 14, 1908—Association of Railway Superintendents of Bridges and Buildings, Washington, D. C.

November 10-11-12, 1908—Roadmasters and Maintenance of Way Association of America, Milwaukee, Wis.

November 30-December 1—American Society of Refrigerating Engineers, New York.

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Engineers' Club of Cincinnati—President H. C. Innes; Secretary, E. A. Gast, P. O. Box 333, Cincinnati, Ohio. Meets third Thursday each month, except July and August.

Engineers' Club of Minneapolis—President, James B. Gillman, Minneapolis, Minn.; Secretary, O. P. Bailey, 935 Lumber Exchange, Minneapolis.

Engineers' Club of Philadelphia—President, H. W. Spangler, Univ. of Penn., Philadelphia, Pa.; Secretary, H. G. Parring, 16 S. Broad St., Philadelphia, Pa. Meetings first and third Saturdays, each month, except July and August, 8:15 p. m.

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Engineers' Society of Western Pennsylvania—President, Julian Kennedy, 5400 Forbes St., Pittsburg; Secretary, F. V. McMullin, 803 Fulton Bldg., Pittsburg.

Illinois Society of Engineers and Surveyors—President, Dabney H. Maury, Peoria,

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Indianapolis Engineers' Club—Indianapolis, Ind.

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Ohio Engineering Society—President, G. A. McKay, City Engineer, Xenia, Ohio; Secretary, E. B. Bradbury, 85 N. High st., Columbus, Ohio.

Pacific Northwest Society of Engineers—President, James C. Jeffrey, Seattle, Wash.; Secretary, Arthur H. Dimock, Lowman Building, Seattle, Wash.

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Western Society of Engineers—President, C. F. Loweth, 1734 Monadnock Block, Chicago; Secretary, J. H. Warder, Monadnock Block, Chicago, Ill. Regular meetings first Wednesday; extra meetings generally third Wednesday, each month, except July and August.

## MECHANICAL AND TRADE SOCIETIES.

Air Brake Association—President, Geo. R. Parker; Secretary, F. M. Nellis, 53 State St., Boston, Mass.

American Order of Steam Engineers—Supreme Chief Engineer, J. Diedrich, 226 North Carolina St., Baltimore, Md.; Supreme Corresponding Engineer, Frederick Markoe, 931 North Orianna St., Baltimore, Md.

American Railway Association—President, W. C. Brown, New York City; Secretary, W. F. Allen, 24 Park Pl., New York City.

American Railway Engineering and Maintenance of Way Association—President, A. W. Johnston, N. Y. C. & St. L. Ry., Cleveland, Ohio; Secretary, E. H. Fritch, 962 Monadnock Block, Chicago, Ill.

American Railway Master Mechanics' Association—President—Wm. McIntosh, S. M. P., Cent. Ry. of N. J., Jersey City, N. J.; Secretary, J. W. Taylor, 390 Old Colony Building, Chicago.

American Society of Railroad Superintendents—President, W. L. Derr, Erie R. R., Elmira, N. Y.; Secretary, C. A. Hammond. Mt. Vernon, N. Y.

American Street and Interurban Railway Association—President, Calvin G. Goodrich, care Twin City Rapid Transit Co., Minneapolis, Minn.; Secretary, B. V. Swenson, Engineering Societies' Building, 29 West 39th St., New York City.

American Street and Interurban Railway Engineering Association—President, H. H. Adams, Baltimore, Md.; Secretary, S. Walter Mower, London, Canada.

American Street and Interurban Railway Manufacturers' Association—President, Jas. H. McGraw, New York City; Secretary, George Keegan, Park Row Building, New York City.

Association of Maintenance of Way Master Painters (United States and Canada)—President, A. B. Phelps, L. S. & M. S. Ry., Cleveland, Ohio; Secretary, H. J. Schnell, 100 William St., New York City.

Association of Railway Superintendents of Bridges and Buildings—President, J. B. Sheldon, N. Y., N. H. & H. R. R., Providence, R. I.; Secretary, S. F. Patterson, B. & M. R. R., Concord, N. H.

American Boiler Manufacturers' Association—President, M. F. Cole, Newnan, Ga.; Secretary, J. D. Farasey, First St. & Erie Ry., Cleveland, Ohio.

Canadian Association of Stationary Engineers—President, Chas. Mosely, Toronto, Ontario, Canada; Secretary, W. Inglis, 554 Bloor St., Toronto, Ontario, Canada.

Canadian Roadmasters' Association—President, A. McAley, Can. Pac. Ry., Toronto Junction, Ontario, Canada.

Car Foremen's Association of Chicago—President, T. H. Goodnow, L. S. & M. S. Ry., Chicago; Secretary, Aaron Kline, 326 N. 50th Ct., Chicago, Ill. Regular meetings second Monday night each month, Room 811, Masonic Temple, Chicago.

Engine Builders' Association of United States—President, C. A. Gates; secretary, J. I. Lyle, 59 Courtland St., New York City.

International Railroad Master Blacksmiths' Association—President, Geo. H. Judy, B. & O. R. R., Lima, Ohio; Secretary, A. I. Woodworth, C., H. & D. Ry., Lima, Ohio.

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National Association of Stationary Engineers—President, Jos. F. Carney, 726 Beck St., Bronx, N. Y.; Secretary, F. W. Raven, 325 Dearborn St., Chicago, Ill.

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tary, Earl G. Smith, 241 Railway Exchange Building, Chicago.

Railway Store Keepers' Association—President, J. M. Taylor, I. C. Ry., Chicago; Secretary, J. P. Murphy, Box C, Collinwood, Ohio.

Road and Track Supply Association—President, W. E. Clark, 401 Marquam Building, Portland, Ore.; Secretary, John N. Reynolds, Railway Age, Chicago.

Roadmasters and Maintenance of Way Association—President, C. Ruhrer, L. S. & M. S. Ry., Sandusky, Ohio; Secretary, C. E. Jones, C., B. & Q. Ry., Beardstown, Ill.

Traveling Engineers' Association—President, A. M. Bickel, L. S. & M. S. Ry., Elkhart, Ind.; Secretary, W. O. Thompson, N. Y. C. Car Shops, E. Buffalo, N. Y.

### Bubbles.

Money talks, even when it's hush money.

It takes a tidy sum to make a neat fortune.

The counterfeiter succeeds in making himself a bad penny.

To steal a ride is dangerous, but it's no sin to take a street car.

To get along swimmingly, one may need a stroke of luck.

When some people get a pile of money, they pile on the agony.—Philadelphia Bulletin.

### Their Turn.

Wall Street had some little lambs,
Who had some golden fleece,
And everywhere those lambs did go,
Their fleecing did not cease.

For bulls and bears they followed fast
Where little lambkins went,
And took turns, though not in such ways
As flipping of a cent.

The little lambs did gamble with
These others to their cost,
For somehow as the game went on,
The lambs they always lost.

But still so nice and innocent
The bulls and bears appeared,
The little lambs suspected naught,
Till they found they were sheared.

Then one day came a panic up,
(A panic, children dear,
Is like when you're scared in the dark
Where nothing is to fear).

A dreadful thing for bulls and bears,
They call a stringency,
Came from the panic and these two
From lambkins turned to flee.

And when the dreadful bulls and bears,
Thus fleecing had to quit,
The little lambs just gambled on,
For they saw they were "IT."

So now it is the lamkbins' turn
For wonders never cease;
But wait a while and just watch out,
To see who has the fleece.

—Baltimore American.

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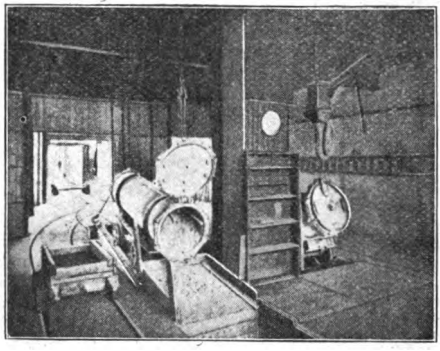
of copper solution are required by this test, with a dry-wiping at each immersion. Many of the samples of material galvanized by the hot process broke down after these four immersions, but the sherardized samples stood ten immersions without injury.

There are many advantages of sherardizing which at once become apparent when the process is used. Some of them are as follows:

1. The zinc forms an actual alloy with the exposed metal and renders it far more difficult to corrode than ordinary galvanized articles. The coating has less tendency to peel on this account.

2. There is no zinc dross produced.

3. The plant may be started within a few minutes, and does not require the melting of a large mass of zinc, as in hot galvanizing.



4. No fumes are given off.

5. The thickness of the coating may be varied if desired.

6. An even coating of zinc may be contained on articles, no matter what their shape is. This is impossible when dip galvanizing is used.

7. Skilled labor is unnecessary.

8. Sherardized surfaces are harder than those which have been galvanized in the ordinary way.

9. The threads of screws or similar indented portions of articles are not filled up.

10. Sherardized articles may be soldered, painted, or otherwise treated.

Although sherardizing has been carried on in England and other countries, it has only recently been introduced into the United States. The United States Dry Galvanizing Company, of 34 Pine street, New York City, are the American agents for the process. A small plant is now being operated in New York City, and another is in process of construction in New Jersey. The illustration herewith shown was taken at the English works of the London Sherardizing Company, Willesden Junction, London.—Canadian Machinery.

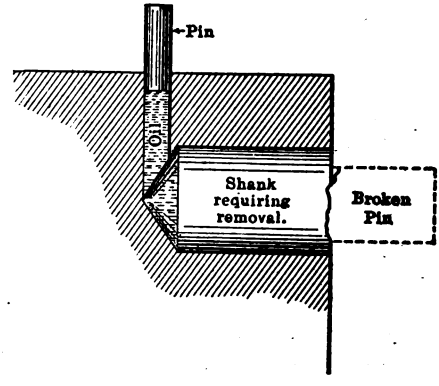
## Removal of Stop-pin Shanks by Hydraulics.

(From American Machinist.)

A well known screw machine has a series of hardened stop pins inserted in the end of a revolving cylinder, and the breaking of these pins is a source of considerable annoyance to both operator and tool room; perhaps not so much the mere breakage, as the difficulty of removing the broken shank which is left in the cylinder.

Our custom was to go after them with a chisel and remove them as best we could, damaging the cylinder to a greater or less extent—usually greater—as the shanks are made quite a snug fit. Finally an unusually obstinate shank, the end of which had become somewhat upset, and the hole badly burred, seemed to demand annealing and removing the pin by drilling.

Suspecting a cavity to exist at the bottom of the hole in the cylinder, we drilled a small hole clear through to the cavity




REMOVING A BROKEN PIN

and filled the entire space with machine oil, being careful to exclude all air bubbles. A nicely fitted wire was next inserted in the drilled hole and struck a smart tap with a hammer, when the obstinate shank

flew halfway across the tool room. We now have all our cylinders drilled in this manner and the tool room is no longer called upon to dismantle machines and remove pins, the operator removing them readily himself.

This kink in hydraulics may be made use of to advantage in many other places beside screw machines.

Bradford, Penn. W. G. H.

### 25,000 H. P. Engine.

To the United States Steel Corporation, which has led the way in so many vast industrial enterprises, falls the credit of installing the most powerful engine ever built for use in any country of the world. This machine, which has a capacity of 25,000 H.P., or nearly double the size of its nearest rival, was erected complete in the great engine-building shops of Allis-Chalmers Company, at West Allis, near Milwaukee, and recently dismantled for shipment to the mills of the Carnegie Steel Company at South Sharon, Pa., where it will be put to work as soon as the huge parts can be reassembled.

Some idea of the size of this monster may be gained from the fact that two of the castings for it weighed, after machining, 118 tons each, with other parts in proportion, requiring for their transportation the special reinforced 100-ton cars built in the C., M. & St. P. shops, at Milwaukee, for Allis-Chalmers Co., a line of which is maintained by that company for just such purposes as this. The engine, as a whole, weighs 550 tons, without foundation-plates or fly-wheel. It is a horizontal, twin-tandem rolling mill engine, with cylinders 42" and 70" x 54" stroke, designed to operate condensing at 175 pounds steam pressure and a speed of 150 to 200 R. P. M., developing its maximum power at the highest number of revolutions.

Notwithstanding the enormous size of the engine and the tremendous power which it exerts, it is controlled as easily as a sewing machine and requires the services of only one engineer. Being used to operate the rolls in a steel mill, it has to be quickly reversed at the end of each run, and the load varies within a few moments from nothing to the maximum power exerted. The reversing mechanism used for changing the direction of the engine is of the Reynolds-Marshall type and run by a small independent engine with oil cylinder lock. Another small engine is also employed in operating the steam throttle valves, all of those units being under the perfect control of the one engineer. No more than a few seconds' time is needed for the act of reversing.

Some years ago the work of installing a machine of this size would have required months, with considerable additional time spent in "tuning it up" for service; but Allis-Chalmers Company has built for the United States Steel Corporation, and others, so many huge engines of this class that its engineers and erecting men have acquired extraordinary facility in the work. An instance of it is the installation of an engine which preceded the 25,000 H.P. unit above described. This was placed on its foundation and completely assembled within ten days after arrival at the mill, notwithstanding that before the new engine could be erected an old one, which had been kept in service until the last minute, had to be torn out.

Most remarkable of all, however, is the fact, that, within thirty minutes after the last bolt had been adjusted and steam admitted to the cylinders, the engine was doing its full work rolling rails and remained continuously in operation from that time forward. Such a record could be true of none other than the "Steel Age."

### Tip to Prodigals.

"I take notice," philosophically said old Brother Dinger, who was a great hand to cogitate, "dat in dese days, whilst we are dess as glad as we ever was when a sinnah refawms, we don't make so much fuss about it as we used to. We respects and indawses his action as much as we ever did but we don't shout so loud. Nowadays, de wise prodigal brings along his own calf; if he don't he's li'ble to butt up ag'in a big disapp'intment. We's a heap mo' for solid business, dese times, and lots less for noice, dan we used to was. Yassah!"—Puck.

# Safe Loads on Staybolts

By GEORGE P. PEARCE

In designing pressure tanks, boilers and vessels having flat surfaces where staybolts must be used, the table herewith, which has been worked out by the author and found useful in such designing, may be relied upon.

To illustrate the use of the table, suppose that a surface 18 by 30 inches is to be stayed against a pressure of 100 pounds per square inch, and that we wish to use ¾-inch stay-bolts. The question is, what shall be the spacing for these? The total area will be 540 square inches, with a pressure of 100 pounds gives 54,000 pounds to be supported. A ¾-inch bolt using United States standard thread would have ten threads to the inch, and, if we allow a breaking stress of 60,000 pounds per square inch with a factor of safety of 8, the safe stress will be 7,500 pounds. From the table, a ¾-inch bolt at 7,000 pounds will stand 2,114 pounds, and at 8,000 will stand 2,416. At 7,500 it would stand half way between this, or 2,265 pounds. To carry the 54,000 pounds will, then, require 54,000 ÷ 2,265, or practically twenty-four bolts. These should, of course, be so spaced as to divide the area into equal squares.—The Engineer.

TABLE FOR FINDING THE SAFE LOADS ON STAYBOLTS.

| DIAM. INS. | | THREADS | | AREA OF | | SAFE LOAD AT THE FOLLOWING STRESSES PER SQ. IN. | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| FRAC. | DEC. | U.S. | SHARP V | BOLT | ROOT OF THREAD | 4,000 LBS. | 5,000 LBS. | 6,000 LBS. | 7,000 LBS. | 8,000 LBS. | 9,000 LBS. |
| 5-8 | 0.625 | 11 | — | 0.307 | 0.202 | 808 | 1,010 | 1,212 | 1,414 | 1,616 | 1,818 |
| 5-8 | 0.625 | — | 10 | 0.307 | 0.160 | 640 | 800 | 960 | 1,120 | 1,280 | 1,440 |
| 5-8 | 0.625 | — | 12 | 0.307 | 0.181 | 724 | 905 | 1,086 | 1,267 | 1,448 | 1,629 |
| 3-4 | 0.75 | 10 | — | 0.442 | 0.302 | 1,208 | 1,510 | 1,812 | 2,114 | 2,416 | 2,718 |
| 3-4 | 0.75 | — | 10 | 0.442 | 0.261 | 1,044 | 1,305 | 1,566 | 1,827 | 2,088 | 2,349 |
| 3-4 | 0.75 | — | 12 | 0.442 | 0.288 | 1,152 | 1,440 | 1,728 | 2,016 | 2,304 | 2,592 |
| 7-8 | 0.875 | 9 | — | 0.601 | 0.420 | 1,680 | 2,100 | 2,520 | 2,940 | 3,360 | 3,780 |
| 7-8 | 0.875 | — | 10 | 0.601 | 0.387 | 1,548 | 1,935 | 2,322 | 2,709 | 3,096 | 3,483 |
| 7-8 | 0.875 | — | 12 | 0.601 | 0.419 | 1,676 | 2,095 | 2,514 | 2,933 | 3,352 | 3,771 |
| 1 | 1 | 8 | — | 0.785 | 0.550 | 2,200 | 2,750 | 3,300 | 3,850 | 4,400 | 4,950 |
| 1 | 1 | — | 10 | 0.785 | 0.537 | 2,148 | 2,685 | 3,222 | 3,759 | 4,296 | 4,833 |
| 1 | 1 | — | 12 | 0.785 | 0.575 | 2,300 | 2,875 | 3,450 | 4,025 | 4,600 | 5,175 |
| 1 1-8 | 1.125 | 7 | — | 0.994 | 0.694 | 2,776 | 3,470 | 4,164 | 4,858 | 5,552 | 6,246 |
| 1 1-8 | 1.125 | — | 10 | 0.994 | 0.711 | 2,844 | 3,555 | 4,266 | 4,977 | 5,688 | 6,399 |
| 1 1-8 | 1.125 | — | 12 | 0.994 | 0.755 | 3,020 | 3,775 | 4,530 | 5,285 | 6,040 | 6,795 |
| 1 1-4 | 1.25 | 7 | — | 1.227 | 0.893 | 3,572 | 4,465 | 5,358 | 6,251 | 7,144 | 8,037 |
| 1 1-4 | 1.25 | — | 10 | 1.227 | 0.911 | 3,644 | 4,555 | 5,466 | 6,377 | 7,288 | 8,199 |
| 1 1-4 | 1.25 | — | 12 | 1.227 | 0.960 | 3,840 | 4,800 | 5,760 | 6,720 | 7,680 | 8,640 |
| 1 3-8 | 1.375 | 6 | — | 1.485 | 1.057 | 4,228 | 5,285 | 6,342 | 7,399 | 8,456 | 9,513 |
| 1 3-8 | 1.375 | — | 10 | 1.485 | 1.134 | 4,536 | 5,670 | 6,804 | 7,938 | 9,072 | 10,206 |
| 1 3-8 | 1.375 | — | 12 | 1.485 | 1.189 | 4,756 | 5,945 | 7,134 | 8,323 | 9,512 | 10,701 |
| 1 1-2 | 1.5 | 6 | — | 1.767 | 1.295 | 5,180 | 6,475 | 7,770 | 9,065 | 10,360 | 11,655 |
| 1 1-2 | 1.5 | — | 10 | 1.767 | 1.383 | 5,532 | 6,915 | 8,298 | 9,681 | 11,064 | 12,447 |
| 1 1-2 | 1.5 | — | 12 | 1.767 | 1.443 | 5,772 | 7,215 | 8,658 | 10,101 | 11,544 | 12,987 |
| 1 5-8 | 1.625 | 5 1-2 | — | 2.074 | 1.515 | 6,060 | 7,575 | 9,090 | 10,605 | 12,120 | 13,635 |
| 1 5-8 | 1.625 | — | 10 | 2.074 | 1.655 | 6,620 | 8,275 | 9,930 | 11,585 | 13,240 | 14,895 |
| 1 5-8 | 1.625 | — | 12 | 2.074 | 1.722 | 6,888 | 8,610 | 10,332 | 12,054 | 13,776 | 15,498 |
| 1 3-4 | 1.75 | 5 | — | 2.405 | 1.746 | 6,984 | 8,730 | 10,476 | 12,222 | 13,968 | 15,714 |
| 1 3-4 | 1.75 | — | 10 | 2.405 | 1.953 | 7,812 | 9,765 | 11,718 | 13,671 | 15,624 | 17,577 |
| 1 3-4 | 1.75 | — | 12 | 2.405 | 2.025 | 8,100 | 10,125 | 12,150 | 14,175 | 16,200 | 18,225 |
| 1 7-8 | 1.875 | 5 | — | 2.761 | 2.051 | 9,204 | 10,255 | 12,306 | 14,357 | 16,408 | 18,459 |
| 1 7-8 | 1.875 | — | 10 | 2.761 | 2.275 | 9,100 | 11,375 | 13,650 | 15,925 | 18,200 | 20,475 |
| 1 7-8 | 1.875 | — | 12 | 2.761 | 2.352 | 9,408 | 11,760 | 14,112 | 16,464 | 18,816 | 21,168 |
| 2 | 2 | 4 1-2 | — | 3.142 | 2.302 | 9,208 | 11,510 | 13,812 | 16,114 | 18,416 | 20,718 |
| 2 | 2 | — | 10 | 3.142 | 2.621 | 10,484 | 13,105 | 15,726 | 18,347 | 20,968 | 23,589 |
| 2 | 2 | — | 12 | 3.142 | 2.704 | 10,816 | 13,520 | 16,224 | 18,928 | 21,632 | 24,336 |

Some men need a little rough weather to develop their seamanship.

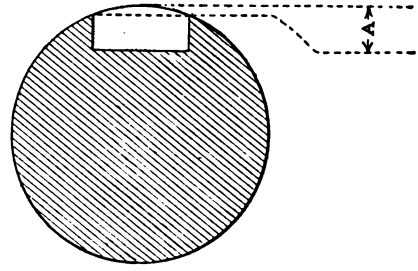
---

During the recent financial stress the men to whom the country looked for deliverance were not noted as being either comedians or pessimists.

## Table for Total Keyway Depth.

This is a table which I find very useful in feeding the milling cutter down into a shaft.

Having the size of the shaft to be keywayed, look down the column marked "Size of Shaft" until you come to the number representing that size; then follow this line to the right until you reach the column representing the size keyway, and the decimal there represented is the distance *A*, which added to the depth of the keyway will give the total depth from the point where the cutter first begins to cut.—C. Weber Bennett, in American Machinist.




## Derivation of a Term.

The reason we call money "dust"
Is, as I've cause to know it,
To get it we must raise the wind—
How easy then to blow it.

—New York Sun.

| Size of Shaft | 1/4 Keyway | 5/16 Keyway | 3/8 Keyway | 7/16 Keyway | 1/2 Keyway | Size of Shaft | 1/4 Keyway | 5/16 Keyway | 3/8 Keyway | 7/16 Keyway | 1/2 Keyway |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 1/2 | 0.0325 | ..... | ..... | ..... | ..... | 2 1/16 | 0.0068 | 0.0104 | 0.0155 | 0.0209 | 0.0274 |
| 9/16 | 0.0289 | ..... | ..... | ..... | ..... | 2 1/8 | 0.0066 | 0.0102 | 0.0152 | 0.0202 | 0.0267 |
| 5/8 | 0.0254 | 0 0413 | ..... | ..... | ..... | 2 3/16 | 0.0064 | 0.01 | 0.0149 | 0.0198 | 0.026 |
| 11/16 | 0.0236 | 0.0379 | ..... | ..... | ..... | 2 1/4 | 0.0063 | 0.0098 | 0.0146 | 0.0194 | 0.0253 |
| 3/4 | 0.022 | 0.0346 | 0.0511 | ..... | ..... | 2 5/16 | 0.0061 | 0.0094 | 0.0142 | 0.0189 | 0.0247 |
| 13/16 | 0 0198 | 0 0314 | 0.0465 | ..... | ..... | 2 3/8 | 0.006 | 0.009 | 0.0139 | 0.0185 | 0.0242 |
| 7/8 | 0 0177 | 0.0283 | 0.042 | 0.0583 | ..... | 2 7/16 | 0.0059 | 0.0089 | 0.0136 | 0.018 | 0.0236 |
| 15/16 | 0.0164 | 0 0264 | 0.0392 | 0 0544 | ..... | 2 1/2 | 0.0058 | 0.0088 | 0.0133 | 0.0176 | 0.023 |
| 1 | 0.0152 | 0.0246 | 0.0365 | 0.0506 | 0 067 | 2 9/16 | 0 0057 | 0 0086 | 0.0129 | 0.0172 | 0.0226 |
| 1 1/16 | 0.0143 | 0.0228 | 0.0342 | 0.0476 | 0.0625 | 2 5/8 | 0.0056 | 0.0084 | 0.0126 | 0.0168 | 0.022 |
| 1 1/8 | 0.0136 | 0.021 | 0.0319 | 0.0446 | 0 0581 | 2 11/16 | 0.0054 | 0.0083 | 0.0122 | 0.0164 | 0.0216 |
| 1 3/16 | 0.0131 | 0.0204 | 0.0304 | 0.0421 | 0.0551 | 3 | 0.0053 | 0.0081 | 0.0119 | 0.0161 | 0.0211 |
| 1 1/4 | 0.0127 | 0.0198 | 0.029 | 0.0397 | 0.0522 | 3 1/16 | 0.0052 | 0.008 | 0.0116 | 0.0158 | 0.0207 |
| 1 5/16 | 0.0123 | 0.0191 | 0.0279 | 0.038 | 0.0499 | 3 1/8 | 0.0051 | 0.0078 | 0.0114 | 0.0155 | 0.0202 |
| 1 3/8 | 0.012 | 0.0185 | 0.0268 | 0.0364 | 0.0477 | 3 3/16 | 0.005 | 0.0076 | 0.0112 | 0.0157 | 0.0198 |
| 1 7/16 | 0.0114 | 0.0174 | 0.0254 | 0.0346 | 0.0453 | 3 1/4 | 0.0049 | 0.0075 | 0.011 | 0.0149 | 0.0194 |
| 1 1/2 | 0.011 | 0.0164 | 0.024 | 0.0328 | 0.0429 | 3 5/16 | 0.0048 | 0.0074 | 0.0108 | 0.0146 | 0.0191 |
| 1 5/8 | 0.0107 | 0.0158 | 0.0231 | 0.0309 | 0.0412 | 3 3/8 | 0.0047 | 0.0072 | 0.0106 | 0.0143 | 0.0187 |
| 1 5/8 | 0.0105 | 0.0153 | 0.0221 | 0.0291 | 0.0395 | 3 7/16 | 0.0046 | 0.0071 | 0.0104 | 0.014 | 0.0184 |
| 1 11/16 | 0.0102 | 0.0147 | 0.0214 | 0.0282 | 0.0383 | 3 1/2 | 0.0045 | 0.007 | 0.0102 | 0.0138 | 0.018 |
| 1 3/4 | 0.0099 | 0.0142 | 0.0207 | 0.0274 | 0.0371 | 3 9/16 | 0.0044 | 0.0039 | 0.0101 | 0.0135 | 0.0188 |
| 1 13/16 | 0.0095 | 0.0136 | 0.0198 | 0.0265 | 0.0355 | 3 5/8 | 0.0043 | 0.0037 | 0.01 | 0.0133 | 0.0174 |
| 1 7/8 | 0.0093 | 0.013 | 0.019 | 0.0257 | 0.0339 | 3 11/16 | 0.0042 | 0.0036 | 0.0099 | 0.0131 | 0.0171 |
| 1 15/16 | 0.009 | 0.0127 | 0.0184 | 0.025 | 0.0328 | 3 3/4 | 0.0042 | 0.0065 | 0.0098 | 0 0128 | 0.0168 |
| 2 | 0 0088 | 0.0124 | 0.0179 | 0.0243 | 0.0317 | 3 13/16 | 0.0041 | 0.0064 | 0.0097 | 0.0126 | 0.0166 |
| 2 1/16 | 0.0083 | 0.0117 | 0.0173 | 0.0236 | 0 0308 | 3 7/8 | 0.0041 | 0.0063 | 0.0096 | 0.0124 | 0.0163 |
| 2 1/8 | 0.0078 | 0.0111 | 0.0168 | 0.0229 | 0.0299 | 3 15/16 | 0.0041 | 0.0062 | 0.0095 | 0.0123 | 0.0161 |
| 2 3/16 | 0.0073 | 0.0109 | 0.0163 | 0.0222 | 0 0291 | 4 | 0.001 | 0.0061 | 0.0094 | 0.0121 | 0.016 |
| 2 1/4 | 0.007 | 0.0107 | 0.0159 | 0.0216 | 0.0282 | | | | | | |

TABLE SHOWING THE DISTANCE "A" IN CUT ABOVE, FOR KEYWAYS FROM 1/4 TO 1/2 INCH IN WIDTH AND FOR SHAFTING FROM 1/2 INCH TO 4 INCHES IN DIAMETER. THIS DISTANCE IS ADDED TO THE DEPTH OF KEYWAY TO GET THE TOTAL DEPTH OF ... OUTSIDE OF SHAFT

## A Stupendous Water Project.

BY CHARLES ALMA BYERS.

The city of Los Angeles, California, is to have the most stupendous water system, considered by miles of aqueduct, of any city in the United States. It has recently voted the necessary bonds to do the work, and the preliminary steps toward beginning actual operations are now being taken. The project, being for the purpose of furnishing Los Angeles and several smaller cities of southern California with an adequate water supply, provides for the building of an aqueduct across deserts and through mountain ranges 246 miles in length and will necessitate, according to the official estimate, the expenditure of $25,000,000. The city bond issue recently voted amounts to $23,000,000, which, it is thought, will have to be increased by $2,000,000 before the work is entirely completed.

The source of this supply of water, which is to meet the needs of a possible population of 2,000,000, is the Owens River, rising in the eastern part of the Sierra Nevada, 250 miles, as a bird flies, north by east of the city, and flowing southerly, through a valley, into the Owens Lake, a "dead sea" lying at the eastern foot of the mountain range. The river drains an area of about 2,800 square miles, which embraces, it is said, forty mountain peaks more than 12,000 feet high, including Mt. Whitney, the highest peak in the United States, barring Alaska. It is fed by more than twenty streams of various sizes, receiving the water from the perpetual snows and glaciers of the range.

Near the headwaters of this river there is a natural reservoir site—a valley whose only outlet is a narrow, deep gorge, and which has a capacity of 260,000 acre feet, or 85,000,000,000 gallons. The city has acquired this site, and it is the intention to use it eventually to regulate the annual discharge of the Owens River. The mean annual flow of the river is about 600 second feet, a small proportion of which has been and is being used to irrigate land in the valley. The maximum or flood flow is 5,000 second feet, practically all of which has heretofore run to waste into the Owens Lake.

At a point about thirty-five miles north of this lake the water of the river will be diverted into a canal, the mouth of which will be at an elevation above sea-level of 3,800 feet. This canal will conduct the supply on a grade above the natural grade of the river to reservoirs at an elevation of 3,770 feet, which will be 200 feet higher than the lake, and which will give a fall of thirty feet in the thirty-five miles. Between the intake point and the reservoirs several smaller streams will be tapped, which will increase the supply. The reservoirs, two in number, will have a combined capacity of 20,000,000,000 gallons, which will be sufficient to deliver a constant flow of 430 second feet to the aqueduct.

The entire conduit line for the conveyment of this water to the distributing point for the city of Los Angeles, eleven miles north of the city limits, when complete, will comprise 22.2 miles of unlined canal, 164.23 miles of concrete covered conduit, 10.11 miles of tunnel through earth, 18.24 miles of tunnel through rock, 9 miles of steel pipe inverted siphon, 1.8 miles of steel fume, 7.5 miles of reservoir length, and 12.5 miles of natural rocky bed of stream in a steep canyon. For the larger part of this distance the route of the conduit will traverse an open country, with comparatively few obstructions, but there are several miles of the route that will require a great deal of work and some difficult engineering.

The city has purchased in the Owens Valley and along the proposed conduit line 76,581 acres, which includes forty-three miles of river frontage. The purchase price of this land is included in the estimated cost of the water project—$25,000,000.

Since the city has the right to use water sufficient to supply a population of 2,000,000, and this amount is not needed at present for municipal purposes, about one-half of the supply will be sold for use for irrigation. It is estimated that 15,000 inches will be at such disposal during a season, and from the sale of this quantity the city will receive about $1,250,000 as direct revenue from the 100,000 acres which the water will irrigate.

Another use to which the system will be

put will be to furnish power for municipal and private industrial purposes. The aqueduct will be so planned that at a point about thirty-five miles north of the city there will be a drop of 1,500 feet, which will be utilized to develop 90,000 horsepower of electrical energy. From the sale of a large portion of this power the city will receive another considerable income.

Two large reservoirs at the head of what is called the San Fernando Valley will receive the water from the canal and distribute the supply to the city pipe system and the irrigation conduits. The upper one of these reservoirs is at an elevation of 1,270 feet and the lower one at 1,130 feet. The natural pressure from the lower is amply sufficient to convey the water across the valleys and along the mountain sides that intervene between it and the city. From the reservoirs there will be three separate lines to Los Angeles and the surrounding towns to be supplied with water—two gravity conduits and one pressure pipe line.

A comparison of this system with New York's new Catskill water project brings out some interesting points. The New York aqueduct will be 117 miles long, will supply 500,000,000 gallons of water a day, and will cost $162,000,000. The Los Angeles aqueduct will be 246 miles long, will supply 300,000,000 gallons of water daily, and will cost $25,000,000.

The time that will be required to complete the Los Angeles project is estimated at six years.

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### Extras.

Ted—Tom says it costs him more to run his auto than he expected.

Ned—The repairs, I suppose?

Ted—No; the costumes his wife wears when she goes out in it.

---

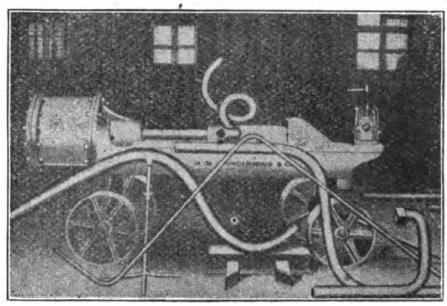
There is work for every one and enough in sight to keep the workers busy for months to come.

---

Don't complain of your lot, there are others who have greater burdens to bear than you.

### Pneumatic Pipe Bending Machine.

H. B. Underwood & Company, of Philadelphia, Pa., have placed on the market a pneumatic pipe bending machine which should appeal to all who have pipe bending to do and have been compelled to do it by hand machine and by filling and heating. The new machine, illustrated herewith, has been in practical use for a number of months in a large railroad repair shop, where it has been employed for all the pipe bending required in equipping locomotives and for air brake and regular work as well. It will make a right angle bend in a 2-in. pipe in two minutes,



and does not flatten or injure the pipe in any way. Dies are furnished of standard radius for locomotive work for ½-in. up to 2-in. pipe, and special dies of any required radius or shape are made to order. H. B. Underwood & Company, the makers, have made a line of portable tools for many years that have become the standard in a large number of the shops, and the new machine is a valuable addition to their already numerous high grade tools.

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### Another Railway Puzzle.

When a train going sixty miles an hour from Chicago meets a train coming from Kansas City at the rate of forty miles an hour, which train meets the other one first?—Chicago Tribune.

---

"Might I suggest, sir, as long as I am going to court your daughter regularly, that you place a new comfortable armchair in your parlor? I have to work hard at the office all day and I can't afford to have my framework worn out at night."

### Hardening Steel by Electricity.

There are about sixty different methods of hardening steel, each of which has its advocates, and no one of which is suited for all sizes and shapes of articles, or for all kinds of steel. One way which has not yet come into general use is hardening by electricity, and is described by Garnier in Le Genie Civil. The process is simple and the appliances necessary neither complicated nor costly; neither is any great amount of previous experience in this particular manner of hardening required. The tool to be hardened is put in electric connection with the positive pole of the battery or other source of current; in similar connection with the negative pole there is a cast iron tank full of carbonate of potash dissolved in water. The current is regulated by a rheostat. The tool is plunged to the desired depth in the solution, just as for hardening in the usual manner; the current is then switched on and the tool heated to the same degree as would be required in ordinary hardening. When the proper temperature has been reached and held for the desired time, the current is switched off and the tool left in the bath, which later, by the simple act of switching off the current, is at once converted into a hardening bath.

Another method, which permits of hardening places on the surface of pieces, where the dipping process would not accomplish the desired object, is local heating with the electric arc. Here the tool or other article is laid on a copper block, and an ordinary arc carbon held in a safety holder; the electric connections with holder and block being made, the carbon pole is touched to the piece to be locally hardened. Of course the heating is both intense and local; the work-piece is at once plunged in the ordinary hardening bath, and when one place is hardened the next may be heated, and so on. The electric current may also be used to draw the temper of a hollow object. Instead of using a red-hot iron rod to plunge in the bore, a cold rod is employed, which is used as a resistance in the circuit of a secondary current of about two volts tension. The temperature of the iron rod gradually rises, and when the work-piece has reached the desired color, the current is shut off. This method is said to produce less liability to cracking than the old fashioned way of drawing the temper with a hot rod. It is particularly recommended for large hollow mills. The great advantage consists in the perfect regulation possible by means of a rheostat, and in the possibility of getting exactly the same temperature every time for similar objects, once the right heat and color are attained.—Scientific American Supplement.

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### The Cost Limit of Speed.

Now that the Lusitania has beaten all ocean records, east and west, and the Mauritania has demonstrated her ability to outdo the Lusitania, we shall probably see a determined effort on the part of the great steamship lines to bring the regular schedule time of their strictly first-class service down to four and one-half or four and three-quarter days. The transatlantic traveler who is impelled by business necessity or by native impatience of mind to cut his traveling time down to the lowest limit, can then be practically sure of being able to complete his journey from house or hotel on one side of the ocean to house or hotel on the other side within five days.

But whether this strenuous haste will pay is a question not likely to be answered by the earlier stages of experiment. Few persons realize at what enormous cost every increase of speed, of railway train or steamship, is attained. Roughly speaking, if speed is increased in arithmetical progression, cost is increased in geometrical progression, until by some revolutionary invention an entirely new system of generating and transmitting power is substituted for the one in use.

While it seems probable that the turbine system has distinct advantages over reciprocating engines, it is not yet demonstrated that the mere ability of the turbine to propel a ship faster and more steadily than the older mechanism could, is also an ability to achieve this result within practicable limits of cost, that is to say, within a cost which stands in such ratio to the gains desirable from increased speed, to be worth while as a business proposition.

### A Box of Cigars.

The day after Christmas my little rear room
Showed plainly Kris Kringle had lifted the latch,
And generously emptied the half of his pack
To brighten the den of a lonely old bach.
It looked like the pick of a fancy-goods store,
Or the loot of a dozen or more of bazaars,
With the pillows, and slippers, and head-rests, and steins,
But what pleased me the most was a box of cigars.

There were photograph frames, there were mufflers of silk,
And neckties of colors most weird to behold,
And handkerchiefs, scarf-pins, and books by the score,
And match-boxes, gun-metal, silver, and gold,
And dressing-gowns crimson, and purple, and blue,
And Christmas cards twinkling with spangles and stars,
And things rigged with ribbon to hang on the wall,
But nothing I liked like the box of cigars.

When the worry and work of the long day is o'er,
And its cares are shut down with the lid of my desk,
Then I love to recline in my easiest chair
And give a free rein to my fancies grotesque.
With my knees to the blaze, and my gaze on the coals
That smoulder like rubies through red-glowing bars,
Oh, the castles I build and the dreams that I weave
From the silvery smoke of those fragrant cigars!

How soothing to watch by the light of the fire
The graceful blue spirals that slowly ascend
To spread o'er the ceiling in soft rolling clouds,
Or with shadows of twilight fantastically blend.
It is then I forget all the sorrows of life,
Its hurries and worries and jangles and jars,
And of all of the gifts merry Christmas can bring,
The best to my mind is a box of cigars.

—Minna Irving.

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### A Home-made Pipe Covering.

Many men in charge of steam plants have places here and there in their plant where there is a short line of uncovered pipe. This, of course, means a loss of heat, but they do not consider it worth while to go to the expense of covering with a regular pipe covering.

The following will make a very acceptable pipe covering and will not cost as much as a regular prepared covering: Wrap the pipe first with a piece of asbestos paper, then wrap well with a layer of excelsior; over all this wrap a piece of canvas and fasten down with wire. Paint the canvas as a finishing touch, and you have as good a pipe covering as you could desire.

The object of the excelsior, which must be packed tightly as possible, is to make a dead-air space, like the air jacket around the cylinder of a steam engine. Dead air is a non-conductor of heat and can be utilized in more places than the jackets of engines. At all flanges leave a space to give access to the bolts. This space may afterward be filled with hair felt.—American Journal of Steam and Electrical Engineering.

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Fail once, and it is an education. Fail twice, and it is a warning. Fail three times and it becomes a hoodoo.

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Beauty may be shallow—but it keeps fate busy throwing the life line to drowning beggars who have fallen overboard.—Sagebrush Philosophy.

# IDEAL POWER

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There is a prevailing impression that the industrial depression resulting from the panic is touching its extreme low point during the current quarter of the year. This depression has been much more abrupt and severe than any one deemed to be possible, and it is certainly the most pronounced since the panic of 1893. It has been felt most acutely in the copper and iron and steel trades, but its influence extends in greater or less degree from the Atlantic to the Pacific. It has laid its hand heavily upon the earnings of the United States Steel Corporation and upon the earnings of the leading railroads of the country. It has rendered idle hundreds of thousands of freight cars and it is throwing out of employment tens of thousands of workmen.

* * *

The country is so strong and has had so many years of prosperity that it can stand a depression of considerable duration, but nevertheless the falling off in business has been so extraordinary, amounting in some instances from 25 to 50 per cent, that it may become necessary for many large corporations to choose between the two horns of a dilemma, the reduction of wages or the cutting of dividends. One gratifying result has been the fact that the depression has increased the efficiency of labor to par, a result attained by the weeding out of drones and the quickening of the zeal of workmen.

In the iron and steel trade, which is so excellent a barometer of general business conditions, there is a strong feeling at present that an improvement will soon set in. Already the steel men can begin to feel the country pulling a trifle for steel products and some of them are confident that the spring will bring about a considerable recovery to the full normal point. This would, in its turn, increase the traffic and earnings of the railroads. The action of the steel men in voting against any concessions in prices is in line with this theory.

* * *

The outlook for a quick recovery in trade conditions would be much more promising if it were not for the political developments. They have not been especially gratifying during the past week. The message of President Roosevelt was not calculated to restore business confidence, and the courage of capital. The announcement of a suit against the Union and Southern Pacific lines, whatever may be said concerning its propriety, was rather threatening to have been begun at this time.—Wall Street Journal.

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Worry destroys the mind's power. Self-control is the essence of manhood. The man who would banish worry by sheer will-power ignores the lessons of every day experience. The best way to rid the mind of worry and rest it, is to fill it with something enjoyable that demands one's entire time and attention. Fly-fishing, bait-casting, horse-back riding, driving an automobile, and an intelligent game of golf are valuable in this connection as well as giving the body through the lungs, immunity baths of oxygen.

### A Wonderful Law.

Bridget and Pat were sitting in an arm-chair, reading an article on "The Law of Compensation." "Accordin' to this, whin a mon loses wan uv his sinses another gits more developed, for instance, a bloind man gits more sence uv hearin', touch, an——"

"Sure, an' it's quite true," exclaimed Pat, "Oi've noticed it myself. Whin a mon has wan leg shorter than the other, begorra the other's longer."—Charles Houston Goudiss.

## High Charges for Repair Parts.

BY JOHN SMITH.

An article in the American Machinist, "High Charges for Repair Parts," has been called to my attention. It seems to me that the writer of this article was not giving the manufacturer a fair show, that an injustice has been done in writing an article of this kind and that more conservative articles ought to be written on this subject.

A manufacturer should be well paid for repairs—much more so than for staple articles or anything else that is manufactured in comparison. A repair is generally for a small item that is outside of the regular work. It requires attention of the very best of help to select this repair, see that it is properly shipped and will answer the purpose for which it is intended. Repairs are frequently kept for many years in order to supply this urgent demand. Frequently when about to change the design of an article that is being manufactured, care must be taken to provide for repairs for those articles that are out. An estimate should be made of about what repairs might be needed; space must be provided to store these repairs. In the meantime, certain portions of the repairs may be called for more rapidly than others. As you are not manufacturing the article, the patterns and jigs may be misplaced or gone; the workman skilled in making these is now not familiar with this piece of work. This single article may necessarily be made at a great disadvantage. If you should charge a man in the first case a low price for the repair, and in the second case should charge him the price that it cost to make the single article, you certainly would make him an enemy forever. Sometimes people are obliged to destroy patterns of obsolete machines in order to make room for other work.

Most people take it for granted that repairs are the fault of the manufacturer, not of the user, and therefore, that the manufacturer should furnish the repair either free of charge or at a nominal price. I have driven along a road where I could hear a windmill squealing a half a mile off. All of us have seen men driving automobiles in a way that will soon make repairs necessary. In my own shop vises have been broken with a clean break 3 inches through.

One day a man brought a jaw of a high-priced vise to me to see if I could make him a new one. I asked him how he broke it, and he stated that he had tried to straighten a good-sized bar, cold. I told him that he had now better buy a new vise and learn a lesson, as there was no way that this jaw could be replaced, for the maker's name was not on the vise.

I have built automobiles; when I had a number of parts left over from an old model the question was, "Shall I work these up into new cars, or what shall I do with them?" I said to the superintendent that we most likely would need some of them. In such a case it is necessary to set the price of these repairs so that what is received from a few will more than pay for what should be received for the whole lot, for some of them will never be called for; but it is impossible to tell in advance. All people expect a repair to be furnished immediately on a telegram order, and are more pleased with the prompt shipment of a repair than they are for a high charge for it.

A few days ago I was getting out some screws for repairs. I had marked a price of 5 cents each for them. One of the employes called my attention to the fact that he thought this was rather a high price, for they did not cost over 1 cent each. This cost is what we would pay for several thousand at a screw factory. These screws must receive considerable handling, and in order to get out an order one of the best men in the shipping room must hunt around through the shop and get the exact screws wanted. Frequently they are sent out by mail, an order having first been made out. Someone must examine the order; another get a suitable box or envelope in which to place the screws, carefully wrapped; an invoice is made out, charged on the books and then a collection made. Possibly several letters must be written because the purchaser thinks he has been overcharged, for the party receiving the articles does not ap-

preciate the time and care taken to fill the order.

It may be that breakages occur from fault of design; but designers are not all wise, nor can they foresee all conditions, and if the manufacturer wishes to live in business he must either add this to the first price of the machine, or, in a more just way, place the price on a repair, for some men will break it and others will not. The one that does not break his tool should not be called upon to pay for the carelessness of others.

When a list of repairs is made out, the sum of these repairs amounts to much more than the entire machine, and the small items are charged more in proportion than the large items. The charge does not apply wholly to the value of the repair, but is similar to the case of a lawyer or a surgeon. It is not the time he puts in just at that moment, but being prepared to perform the service at the time it is needed has a great deal to do with the charge.—American Machinist.

### An Expert's View.

The reporter had run the gauntlet, past the fifth assistant secretary, and was now admitted into the presence of the great Man of Finance.

The Man of Finance wheeled in his chair, laid down the reporter's card, and greeted the man from the newspaper affably. The newsgatherer had anticipated trouble in getting the Man of Finance to talk on the financial stringency, and his graciousness came as a surprise.

"I do not mind being quoted to this extent," smiled the man at the desk, "to the effect that I believe that the present uneasiness has a cause. Cause and effect go hand and hand. Everything would now point to the fact that money in various quantities is hard to get readily. No doubt the origin lies somewhere or other; I am positive that there is an origin.

"The money market fluctuates under different conditions. It is just now fluctuating; this, I would say, is due to the different conditions. The run on the banks withdraws the money from the banks, which tends to exhaust the supply from the banks. If a bank has no money the shortage is felt among its depositors. Thus it is clearly seen that the result is only due to the effect of the cause. Do I make myself clear? Now, please try to quote me exactly, as I do not wish to leave any false or uncertain impression on the public as to my stand on this great question. Good morning."

And so we are reminded of the greatness of our language.—Puck.

### The Wind-up of the Clockwork Pump.

It seems that there has been one flim-flam mechanical game working that Power was not aware of; probably there are others. The one that we have in mind is a pendulum pump which has been inflicted upon the farmers and small capitalists of Kansas, Colorado and other western states. The prospectus said that one man could wind the pump up in fifteen minutes so that it would run for twelve hours and pump twenty gallons of water continuously. This looked good to the farmers and stockmen. They did not stop to think that the pump could by no possibility pump more water than the man who wound it up could pump in the time he was winding it. They could not buy the pumps because they were not yet made, so they bought county rights and stock, and the projectors were so busy cashing checks and money orders that they did not have time to build a pump. The extraordinary amount of mail matter attracted the attention of the postal authorities, and W. M. Meyers and J. F. Rudd, two of the promoters, were convicted on three counts for using the mails to defraud. H. S. McCowan, the third partner, took a severance and will be tried separately.

This is as it should be, but there ought to be some court to appoint guardians for, or to commit to an institution for the incompetent and feeble-minded, those who are so entirely incapable as to be taken in by such a device. So long as easy money lies around in this way there will be those to collect it.—Power.

"Papa, what is the bald-headed row?"

"A kind of Indoor Close to Nature School, my son."

### A Conservation of Fuel.

With the domestic coal supply dwindling at the rate of 400,000,000 tons per year and the foreign supply disappearing at an equivalent rate, the problem of fuel supply takes on more than an academic interest. It is all very well profanely to enquire what posterity has done for us that we should forbear skinning the earth's resources on its account, but from the present outlook this matter has ceased to involve waiting for posterity. It has reached a point where there may be trouble within the lifetime of children now alive. If the coal consumption of the country increases at anything like the present rate it will probably not be more than a quarter of a century before the calamity of far dearer fuel will be upon us. It is not that the supply will be exhausted by then, but that scarcity, long transportation and deep mining will co-operate so to enhance the price of coal as to completely modify present conditions. The coal famine of a few years since shows the disastrous result of even a slight shortage in forcing up the price. What would be the industrial situation with steam coal at ten dollars and upwards per ton permanently? It is not a pleasant thing to contemplate and yet such is the situation which confronts us in the not distant future. It will not be long before most of the remaining coal will be low grade bituminous or lignite. A large part of the fields yet remaining untouched are, in fact, the meanest kind of lignite, entirely unsuited for transportation.

There is not enough wood left to cut any figure in the industrial situation. Of peat, good, bad and indifferent, there is a large amount, but thus far all attempts to get it into utilizable shape on a large scale have proved somewhat futile. The hydraulic power available at reasonable cost of utilization is being rapidly taken up. Even if ten million horsepower were in good shope for profitable development, it would at a rough approximation relieve the present coal consumption by only something like 10 per cent, while that consumption has risen 30 per cent in less than five years. Hydraulic power, then, valuable as it is, can be regarded only as a small auxiliary. Is it not time for electrical engineers to make good their perennial bluff about distributing power from the coal mines? This proposition has been up for a long time, yet nothing substantial has been accomplished. Except for a plant in South Africa and one in Pennsylvania, there is as yet nothing like a serious power transmission from cheap coal. There is a vast amount of culm, lignite and such like stuff which cannot be profitably transported, but might be burned at the mouth of the mine with good economic results if the work were seriously undertaken. Most of it is so situated that it can be advantageously utilized in no other way, undess by the generation and transmission of fuel gas, which, again, is a scheme not yet seriously attempted from such sources of fuel. It is high time that progress were being made in these directions.

Of course there are difficulties at present in the way of burning lignite efficiently and on a large scale. Most boilers and furnaces are designed for use with fairly high-grade fuel, so that burning lignite involves special appliances. Yet there are indications that the problem of using lignite economically has been at least proximately solved. Certainly there are already in existence plants which do use it with pretty good results. It is sufficiently rich to do well once the art of burning it is mastered. With a big turbo-generator plant worked on such cheap fuel, power could be brought down to a point that would permit transmission over a long radius and sale at a good competitive figure, a figure, in fact, that would stagger a good many hydro-electric plants. Gas production and transmission under moderate pressure as in the case of natural gas, would be also practicable in the case of some grades of poor fuel and would give the ability to furnish general heating as well as power. Heating is a terribly serious matter in our northern climate, and if one relies on electrical heating the outlook is bad since the whole power of Niagara could not keep even New York city from freezing to death. When it comes to heating, in fact, there is not enough hydraulic power to be worth serious consideration. Fuel gas, however, can be made to help

out very effectively and may come to be our chief reliance. The present outlook is grave, and it is time to be up and doing. Each year, with its increase of fuel consumption, brings down the current estimate of the endurance of the supply. Not long ago it was five hundred years, then two hundred and now practical exhaustion of the available supply seems a bare century off, with a serious increase of cost looming up in the near future. It is about time to start the fight to preserve the existing status of things lest the pressure on industry bring disaster. Even now there is a tendency to shift activity southward into a milder climate. Before things come to a serious pass it is well to try the virtues of power transmission from the mines.—Engineering Record.

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### Type of Feminine Beauty Most Attractive to Men.

That Chicago restaurant man took a little bit off the top when he advertised the other day for waitresses with red hair and explained that this type of feminine beauty was most attractive to men. Everybody admires the auburn-haired girl with her always expressive eyes, her more than perfect figure and her speaking complexion. She is a goddess crowned with luminous glory—a warm and radiant blossom of womanhood. It is true, of course, that this type of beauty is most attractive to men—unless, it be, instead, that ravishing blonde with eyes of baby blue, than whom there is no creature on earth quite so charming. Painters invariably select her in picturing the winged messengers of the Messiah—and well they may, for surely the Creator could not go astray in choosing his angels from among a flock of these fairies. And, now that it occurs to me, it is probable that the blonde affords the type of beauty most admired by men—unless it be, instead, the winsome maid with raven hair who, as all must admit, is easily the ravishing climax of all feminine loveliness. Were eyes ever brighter, or affording truer pledge of fidelity—did lips ever promise sweeter kisses or bosom more fond embrace? The gypsy type is queen of them all, of course—unless it be, instead, that sunny-hair whose tresses combine incomparable blend of insistent crimson and glint of gold, and whose laughing eyes invite to bliss as they saucily dare you to do. This is the woman of whose resplendent charms poets rave, and for whom red blood willingly pawns paradise. She is then unquestionably the sweetest of her sex—unless it be, instead, that other one of the nut-brown tint, to whom the masculine heart ever turns—this Madonna who most truly typifies the divine ichor of love and passion, and whose entrancing, bewitching and compelling beauty is beyond compare.

T'was Buddha, who, as he pictured the laughing eyes and rosebud lips of womankind, cried out to the All-Wise in an agony which—as has always seemed to me was overworked—to shield him from rounded globes of white, inviting him to bliss. Humanity hath its lotus as has nature—it blossoms in the woman beautiful. And as I have tried to tell, the girl whose sweet face is crowned with red gold, the bewitching blonde, the radiant brunette, the witch with the sun-kissed tresses and that admitted ruler of all hearts, the maid with the nut-brown glory—together with all her sweet sisters with hair of ever pleasing, shimmering and seraphic shade—is the superb and incomparable flower, the sweetest of her sex, and—sure Mike!—most attractive to men.

Bill Barlow.

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Every time a stingy man is forced to let go of a dollar he imagines that he is in a dentist's chair having a tooth pulled.

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### The Leap Year Habit.

Happy thought for February: This year the bills due March 1 will be one day longer in arriving.—Washington Post.

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To create a bad habit you must make a mistake more than once.

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You succeed by doing the right thing again and again until it becomes a habit and in not making the same mistake a second time.


Weak men wait for opportunities, strong men make them.—Marden.

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When I don't know whether to fight or not, I always fight.—Nelson.

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What is a gentleman? I'll tell you: A gentleman is one who keeps his promises made to those who cannot enforce them.—Hubbard.

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Don't be too humble. Everyone steps on the door mat.

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When a man begins to feel that he has a mortgage on his job it is time for his employer to foreclose it.

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You cannot dream yourself into a character; you must hammer and forge one yourself.—Froude.

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Sin is often the prelude to circumspect repentance—which explains many a carnival of warmed over caresses.

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Trial is the last test, and experience beats the books. What a dump of horse sense we fall heir to the next day.

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Three are a crowd—unless the trio happens to be virtue and honesty, and opportunity.

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Married men's infidelities are more than often in willing ratio to the watchfulness of their wives.

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Most people gladly take advice from a stranger.

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Occasionally a full-bearded man tells a barefaced lie.

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Fortunately stupid people seldom realize that they are stupid.

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Occasionally a detective tries to disguise his breath with a clove.

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A man usually aims at a human target when he shoots off his mouth.

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All things come to him who waits—even the almshouse and potter's field.

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A man isn't as anxious to be right as he is to have others think that he is right.

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How we would like to see all the kickers and knockers get together and fight it out.

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The theatrical manager is willing to give everybody a show—for a consideration.

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Ever notice that the compliments some people hand you always leave a bitter taste?

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Even the sarcastic woman declines to make any cutting remarks when she has an ax to grind.

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Dishonest men usually get a lot of things they don't deserve before they finally get behind the bars.

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When a man is sure he has a woman's sympathy he adds fully a hundred per cent to his hard-luck stories.

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